

THE ART OF AMBIGUITY
(Experiencing the Kimbell Art Museum)

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Submitted to the Department of Architecture
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Department of Architecture
August 9, 2001

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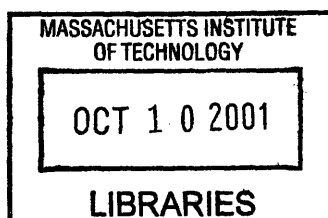

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Abstract

This thesis examines the Kimbell Art Museum in Fort Worth, Texas, designed and executed between 1966 and 1972 by the architect Louis I. Kahn. This study responds to a series of design related questions raised in the author's mind upon visiting the Kimbell museum on June 22, 2000. The work will evaluate the buildings' major design elements, beginning with the overall site and building organization, and end with the relationship between structure, space and natural light. The building is documented with numerous photographs taken during my visit to illustrate its experiential aspects.

This study examines how the Kimbell Art Museum prompts 'readings and re-readings,' associations, symbolisms, and meanings that may initially appear elusive, contradictory or even obscure. My analysis suggests that Louis Kahn designed the Kimbell to generate obscure readings, or to be more precise, he utilized ambiguous design features capable of being understood in two or more possible senses. My analysis also raises questions such as, 'What types of ambiguity are employed in this museum, and why?', and 'How does the Kimbell Art Museum as both building and experience compare to Kahn's stated design goals?' The lens through which this examination takes place is my own experience of the building, tempered by an examination of the building's documentation compared to what Kahn wrote, sketched and built. This project aims to offer plausible insights into the building's numerous, seemingly ambiguous design features. The process of reading and re-reading the Kimbell reveals elusive aspects of the building that to date, have not been adequately considered and articulated. The object of this study is twofold: first, enhance understanding and appreciation of Louis I. Kahn's design methodology, and second, offer alternative evaluations of the Kimbell Art Museum that include a wide palette of design attributes which bridge the gap between the building and its experience, the tangible and intangible, or to use Kahn's words- the measurable and unmeasurable.

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Thesis Co-Advisor: William Porter

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CONTENTS

| | | |
|-----|--|--|
| 5 | Abstract | |
| 9 | Preface | |
| 11 | Part One | The Art of Ambiguity |
| | | Ambiguity in the Architecture of Louis I. Kahn |
| 21 | Introduction | |
| 25 | The Ideal Museum | |
| 27 | Experiencing the Kimbell Art Museum | |
| 29 | Experiential Narrative | |
| 37 | Part Two | The Site Design |
| | | Pre-existing Site Conditions |
| | | First Design Responses |
| | | Site Design Development |
| | | Final Site Plan |
| 61 | Part Three | The Building Design |
| | | Vaults As Idealized Forms |
| | | Structure As Giver Of Light |
| | | Shadows Belong To Light |
| | | A Slice of Sun |
| | | No-Light, Light, No-Light, Light |
| | | The Beginning Of Ornament |
| 108 | Conclusion | From Wonder Is Realization |
| 111 | Endnotes | |
| 115 | Illustration Credits | |
| 116 | Appendices 1 - 5 | Building Data |
| | | Policy Statement |
| | | Pre-Architectural Program |
| | | The Building Plans and Layout |
| | | Biographical Note on Louis I. Kahn |
| 131 | General Bibliography | |

PREFACE

This thesis addresses a palpable void that exists within architectural documentation on the Kimbell Art Museum- the experience of the building itself. Now of course architecture always contains a qualitative, subjective, and personal dimension. Difficult to quantify and describe, the experience of architecture often requires poetic, ambiguous language to adequately convey its subtle, elusive aspects. Louis I. Kahn (1901-1974) certainly spoke in this fashion throughout his career, with cryptic rhetoric as explanations of his designs in general, and the Kimbell specifically. Utilizing Kahn's own preference for obscure descriptions of his work, my thesis traces the design process of the Kimbell to suggest that the museum was designed to foster a type of experiential ambiguity.

Like Kahn's other mature works, the Kimbell Art Museum benefits from various design permutations, budget constraints, and his general procrastination about making final decisions before an 'inevitable' solution had been reached. It is therefore the process of design that is often just as informative as the end product for an understanding and appreciation of Kahn's architecture. This examination of the Kimbell will therefore focus upon Kahn's design process in order to gain insight into Kahn's intentions, and to understand the realized building. Seeking to balance the majority of research done on the Kimbell which focuses primarily on the finished building, my analysis gives greatest attention to Kahn's site and building design processes respectively, as indicators of the experience Kahn may have sought. Ultimately the question of how to analyze subjective, artistic, personal and even contradictory design characteristics is a conundrum embedded within architectural discourse, and reoccurs throughout this analysis.

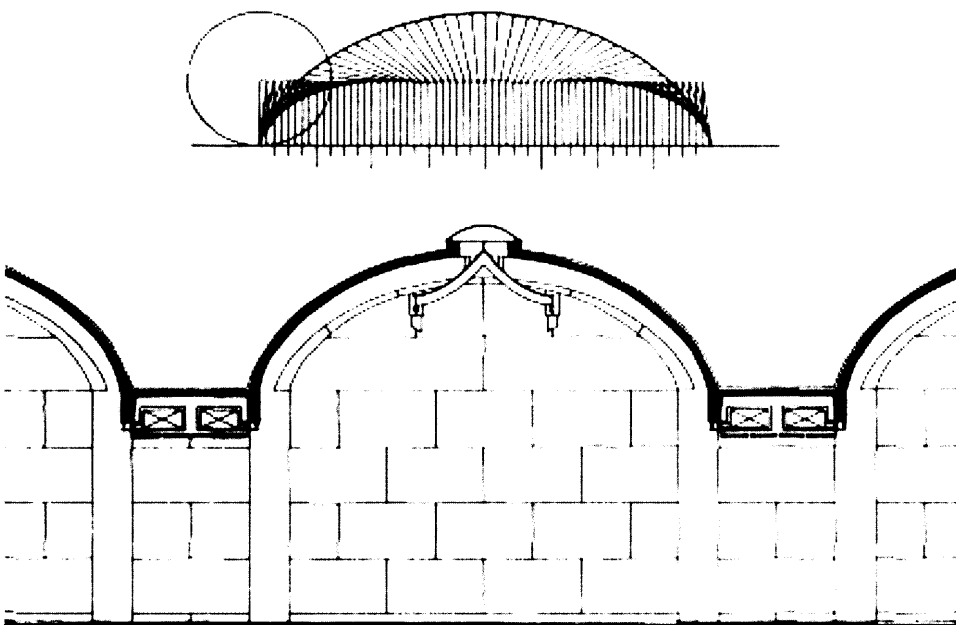
My study presumes a general familiarity with Kahn's oeuvre, and more specifically the Kimbell, since it is usually cited as an architectural masterpiece by historians and practitioners alike. Many of the points raised in this thesis build upon the existing body of knowledge about Kahn's work; others are offered as new interpretations and conjectures. My analysis therefore questions, challenges, and perhaps even contradicts accepted readings about the Kimbell Art Museum and Kahn's work in general. It should also be noted that unless cited otherwise, all quotes in italics are the words of Louis I. Kahn.

This thesis benefits from the generous assistance of Stanford Anderson, Julian Beinart, Ike Colbert, Mark Jarzombek and William Porter.

Experiencing The Kimbell Art Museum

PART ONE

The Art of Ambiguity



1a. Diagram of cycloid curve generation and section through vaults, Kimbell Art Museum Archives.

Ambiguity in the Architecture of Louis I. Kahn



1. Yale University Art Gallery, New Haven, Connecticut 1951-53. Kahn's first museum established an aesthetic of abstraction that would reappear in all of his mature works. The brick skin only appears on this elevation- relating to the adjacent building, and glass is used as the enclosure on remaining facades.

Seeking to appreciate Louis I. Kahn in the proper context, a few brief observations on his legacy served as the beginning of this examination of his buildings and words. First, Kahn was an enigmatic architect: he was described as an outsider, a maverick, a prophet, and even architectural genius. His mature work has continued to receive much attention, with the Yale University Art Gallery of 1951-53, signaling his emergence as a uniquely gifted designer. Like other artists of exceptional talent and ability, Kahn saw the world just a little differently from his contemporaries, and his vision was personal and inimitable. Second, Kahn's words and buildings often seemed mysterious, difficult to read and style-less. There was a great aura of high idealism associated with his work. Something within Louis Kahn connected to the past and prompted a search for the beginnings of architecture, institutions, and even man. Third, Kahn's preoccupation with beginnings, or what he called Volume Zero, was an inspiration for his buildings. Holding himself to what he judged as high ideals drawn from English literature, Kahn searched for what he considered appropriate, untainted architectural offerings for all mankind. But like the classicists Laugier and Ledoux before him, Kahn focused on European beginnings to emphasize pure form in architectural design. Kahn's quest for ideal forms has, justifiably, warranted much critique, yet it remains key to understanding his work.

This search for beginnings is one that has no authenticating document or form...Kahn's enterprise is little concerned with history or tradition; rather it is reciprocally critical and creative between the present and that imagined time immemorial...this search is Janus-faced. Kahn's search for the Volume Zero of English history pursued that goal; his will to hold our schools, churches, and libraries to their higher purposes, institutionally and architecturally, was both the cause and the fruits of that search. Finally, I would reemphasize that Kahn's search was hypothetical: He did not so much find as project. Also, in his backward glance, he projected.¹ -Anderson

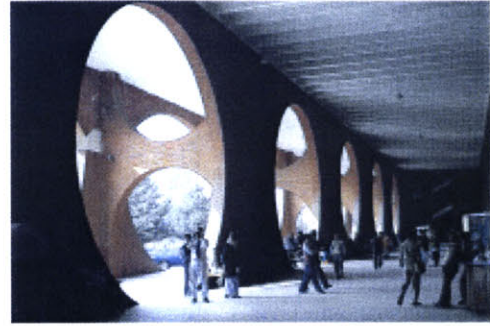
Past, present and future collapsed for Kahn into a palette of archetypes from which he could realize his philosophical ideas about the natural and the man-made. Louis Kahn's emphasis on drawing from the past was not in tandem with his admirers or pupils; his work has always stood apart. Yet he loved interacting with people, as evidenced by the numerous lectures that he gave around the world, and also produced his best work, (and quotes) when challenged by others. Louis Kahn's mature work suggested that the Kantian 'Sensus Communis' rise to his level, and with his built legacy in India, Kahn's designs still challenge aesthetic axioms.² In contrast to the imagery of the Modern Movement, Louis Kahn's work championed solidity, heaviness, structural articulation and pure forms. Yet paradoxically, Kahn had a preference for composing buildings as aggregates of simple geometrical shapes, similar to the classicists Ledoux and Schinkel before him (that Kahn combined seemingly contradictory ideologies was his gift, strength, and perhaps sometimes, his weakness). Louis Kahn was not only concerned with formal composition, but he also sought to orchestrate the experience, or phenomenology of his buildings. As an artist, Louis I. Kahn's words and work inspired poetic interpretations and ambiguous readings. Kahn's mature designs always seemed to eschew accepted stylistic norms; it is still puzzling, personal and difficult to understand.

2. Aerial view of east hostels for the National Assembly, Dhaka, Bangladesh, 1962-83. Kahn's imagery is strangely ancient, yet abstract and modern. Arched openings in curved walls is rare, and establishes its own logic for elevations.



Numerous scholars, such as Vincent Sculley and Colin St. John Wilson, have attempted to identify ambiguity in Kahn's work to explain the contradictions that resist categorization and simulation. One critic that has theorized Kahn's enigmatic work was Robert Venturi. Setting a framework to review architecture from a different aesthetic perspective, Venturi provided a pathway to the appreciation of ambiguity in the architecture of Louis I. Kahn. In the preface of his seminal work of 1966 entitled, *Complexity and Contradiction in Architecture*, Venturi identified the duality at the very heart of Kahn's philosophy.

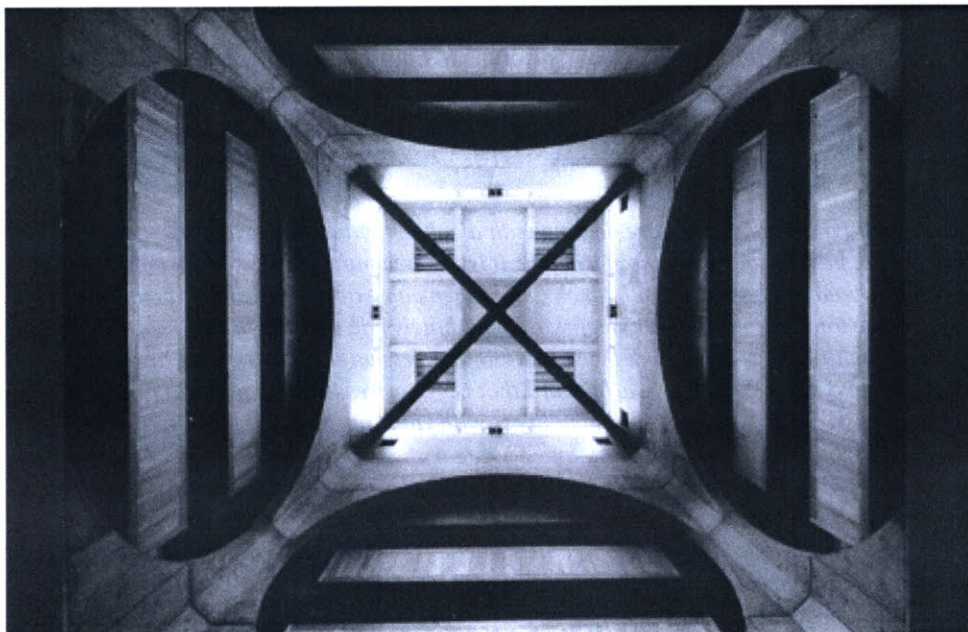
Louis Kahn has referred to what a thing wants to be, but implicit in this statement is its opposite: what the architect wants the thing to be. In the tension and balance between these two lie many of the architect's decisions. A room can have many functions at the same time or at different times. Kahn prefers the gallery because it is directional and nondirectional, a corridor and room at once. Kahn by implication questions rigid specialization and limited functionalism. The multifunctioning room is a possibly truer answer to the Modern architect's concern with flexibility. Valid ambiguity promotes useful flexibility³



Venturi also pointed out a paradox lying previously undetected. Louis Kahn's creations rely upon personal interpretation for their meaning, and therefore his tangible (measurable) buildings are simultaneously subjective, experiential, and intangible(unmeasurable); the two aspects of his work are inseparable. Kahn's description of architecture as measurable and unmeasurable suggested that conceptual ideas were just as important as his final forms. For Kahn, paradox and dualities were a part of the reading and comprehension of his designs. According to Venturi, architecture that included varying levels of meaning bred ambiguities that enriched experience. Venturi reminded architects that architecture has always been a balance between what a thing is and what it seems. This viewpoint has challenged critics to look beyond accepted, initial readings of Kahn's architecture and search for plausible, alternative interpretations. When viewed through Venturi's analysis, Kahn's buildings appeared to employ, and perhaps even promote ambiguity, contradiction, and duality. The reading of ambiguity in the work of Louis Kahn was not just a desirable aim capable of yielding depth and richness otherwise unattainable; it was identified by Venturi as a general recurring theme in architecture as well. Of course ambiguity by nature has always been hard to capture, explain and harder still to master, yet in the hands of Louis I. Kahn, architecture gained an experiential quality that few, (*including Venturi himself*) have been able to achieve. With examples taken from various time periods and places, Venturi argued for an ambiguity that aided the appreciation and experience of Louis Kahn's architecture.

3. View of National Assembly building from south plaza. Kahn offers new alternatives for building form, apertures, and material composition. Ratio of concrete to stone is opposite to Kimbell Art Museum, but their respective structural roles are the same.

4. Entrance veranda and waiting hall of the hospital, National Assembly complex. The design illustrates Kahn's love of the circle as an elemental shape, uniquely made out of brick masonry.



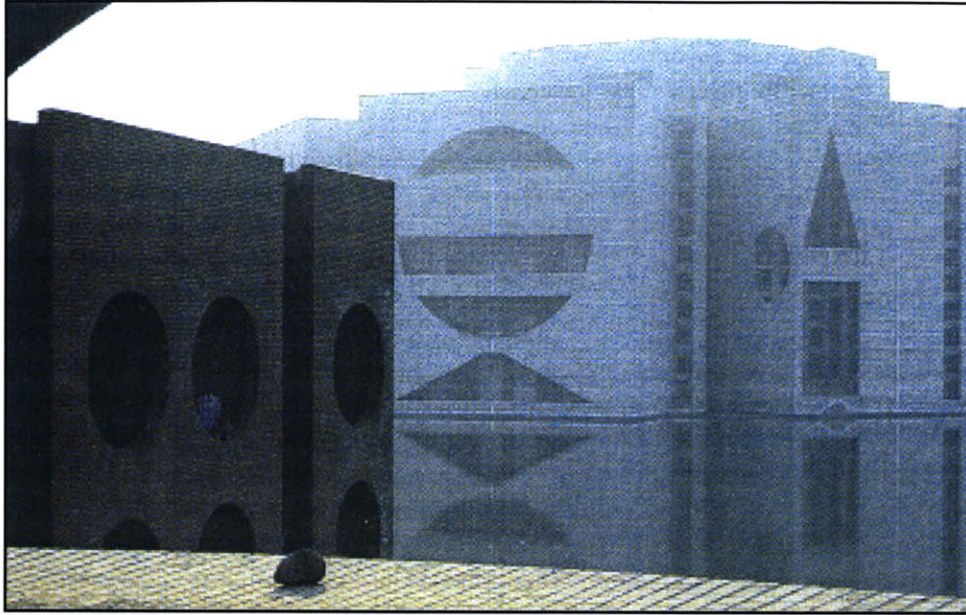
5. Philips Exeter Academy Library, Exeter, New Hampshire, 1967-72. Interior Atrium shows Kahn's signature-massive, monumental form, pure geometries and abstraction with enormous circles. Although the similarity may be coincidental, Kahn's compositions of circles and squares often seem to recall Renaissance diagrams of the Vitruvian man, as total harmony and perfection in the body.

6. Yale Center for British Art, New Haven, Connecticut, 1969-74. Kahn's last museum and realized design during his lifetime continued his search for museum form. The apparently random disposition of windows contrasts with the rational structural frame. Here again Kahn used concrete as structure, combined with an infill material as enclosure.



In addition to pure archetypal forms, simple geometries and rational ideologies, Louis Kahn exploited language to emphasize the phenomenal and experiential. One of the most quoted modern architects, Kahn's words have been described as immediately timeless, elemental and inspired, yet often contradictory and confusing. Difficult to label or categorize, (as it sometimes looked shockingly different from the work of other architects before him), Kahn's mature work presented a peculiar familiarity that defied description. In his lifetime, Louis Kahn was described as a guru who often spoke in his own 'language' on various topics such as Form, Spirit, Desire, Community, Institutions, Man, and famously, Beginnings. "Like so many great teachers, Kahn tended to use words as the veil to a mystery, rather than as a clarification of a truth. This is not indeed a criticism of him."⁴ For Kahn, architecture was the realization of forms inseparable from their ideas, or truths from which they sprang. Towards the end of his career, architect Louis I. Kahn seemed confident, poetic, and still searching for the beginning, or what he identified as volume zero. Kahn expressed architecture as a mystery that conventional words alone could not adequately describe, thus he often invented or altered words to suit his mode of expression. The invention and recombination of words and phrases reinforced Kahn's obscure, mysterious persona.

I would think that if you are dealing with a column, you must give it a beam. You cannot have a column without a beam. It is an elemental think.....Our whole sense of procreation has to do with touch. Sight then came about and sight immediately felt the total harmony. Art, which was immediately felt, was the first word, one can say the first line, but I think the first word, the first utterance, it could have been, 'Ah,' just that. What a powerful word that is. It expresses so much with just a few letters. Wonder is the closest intouchness with your intuitive.... I tried to find what Order is. I was excited about it, and I wrote many, many words of what Order is. Every time I wrote something, I felt it wasn't quite enough. And then I stopped by not saying what it is, just saying, 'Order is.' And somehow I wasn't sure it was complete until I asked somebody, and the person I asked said, "You must stop right there. It's marvelous; just stop there, saying, Order is."



7. National Assembly Building, Dhaka, Bangladesh, 1962-83. Designed concurrently with the Kimbell Art Museum in Texas, Kahn's last realized masterpiece pushed abstraction and monumentality to unparalleled expression in the modern era. Openings do not relate to human scale, but rather the monumental size of the complex, idyllically surrounded by a grand, man-made lake.

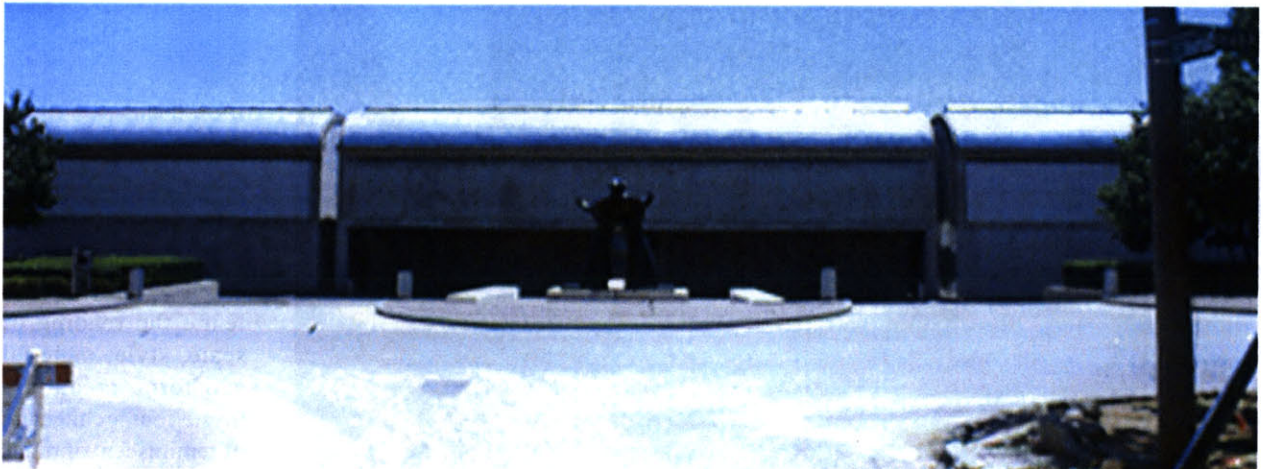


8. National Assembly Building, Presidential Plaza. Kahn has combined circles to challenge the reading of scale, style, material and form, creating a mysterious architecture of reminiscent of ruins.

9. The Kimbell Art Museum in Fort Worth, Texas, 1966-72. Kahn achieved one of his most puzzling entry facades. The logic of the building challenged human desire for windows and doors, and determined the design and placement of all openings. Except for the entry doors hidden behind this sculpture, there are no glazed openings in the entire building placed and scaled for human use.

For Louis Kahn, describing architecture threatened to dilute or even destroy its purity, expression and wonder. Architecture was therefore conceptualized by him as the unmeasurable made measurable, ideas realized in buildings. Even before he designed a specific building, Kahn intimated that the essential architectural desires could not be completely realized, only approximated through poetic metaphors. Former collaborator Anne Tyng has written, "As his realizations reached an increasingly archetypal level, his language became more metaphoric and poetic, and even less easy to understand."⁵ Ambiguity extended from the interpretation of Kahn's words that expressed his architectural ideas, out to the experience of his buildings in a recursive process of discovery and realization. He was a man who believed not in invention but discovery, for whom a building, once realized, was a material and existential fact, projected forward into space and time.⁶ Kahn's buildings have retained their timelessness in part because their style-less-ness, yet paradoxically, his designs drew freely from various historical styles. Consistently challenging and difficult to understand, yet refreshingly unique from the initial, sometimes shocking overall exterior image to the tiniest interior detail, Kahn's buildings resisted categorization. As Venturi observed, familiar things seen in an unfamiliar context become perceptually new as well as old. Perhaps it was the resolution of the tension between the clients' stated program for a building, and his own creative desires that set Kahn apart from his contemporaries. Perhaps Kahn was wary of contemporary attitudes about architectural aesthetics, and simply offered his own visions in built form. Like many other artists of great talent and ability, Louis Kahn was a visionary who challenged accepted norms. He also provided a poetic alternative to architectural discourse and aesthetics, and realized numerous buildings of unusually high construction standards. Thankfully, Kahn inspired a new generation of designers to embrace the multivalent ambiguities of architecture. Louis Kahn was more than an architect; he was an artist.

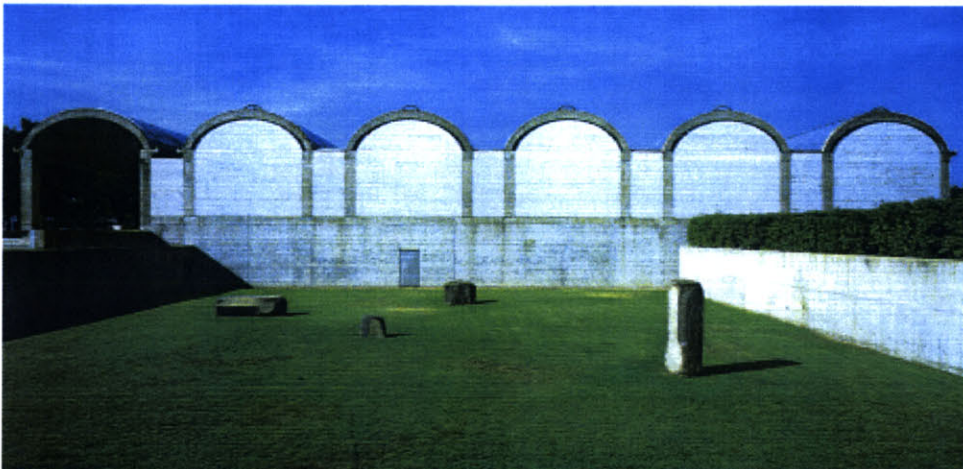
Simultaneous perception of a multiplicity of levels involves struggles and hesitations for the observer, and makes his perception more vivid. Examples which are both good and bad at the same time will perhaps in one way explain Kahn's enigmatic remark: "architecture must have bad spaces as well as good spaces." Apparent irrationality of a part will be justified by the resultant rationality of the whole, or characteristics of a part will be compromised for the sake of the whole. The decision for such valid compromises are one of the chief tasks of the architect.⁷





10. The Salk Institute for Biological Studies, La Jolla, California 1959-65. Open plaza with water emerging from underground and flowing towards the Pacific Ocean. This seemingly sacred, ancient complex alludes to both birth and death, stillness and silence.

I don't believe in need as a force at all. Need is a current, everyday affair. But desire- that is something else again. Desire is the forerunner of a new need. It is the yet not stated, the yet not made which motivates.



11. Lower south court of the Kimbell museum with sculptures by Noguchi- *Constellation* (for Louis Kahn), 1980. Except for an egress door, this side elevation does not have any windows or other signs of human scale to disturb its purity. Archetypal imagery such as vault, arch, portico and cemetery are powerful allusions in Kahn's aesthetic of minimal rationalism.

Introduction

With any building by Louis I. Kahn, it is necessary to carefully examine the design process from initial impulse to final construction, in order to gain insight and appreciation of the realized design. For the Kimbell, the trajectory of design ideas is especially revealing, in terms of acceptance and rejection of preponderant architectural norms. The Kimbell Art Museum (1966-72), must first be seen as part of an ongoing architectural investigation, for it was designed during a very fruitful part of Kahn's career that included the now famous Richards Medical Research Building of 1957-65, the First Unitarian Church and School of 1959-69, the Salk Institute for Biological Studies of 1959-65, the Indian Institute of Management of 1962-74, the Philips Exeter Academy Library of 1965-72, and the National Capital of Bangladesh of 1962-83. Although all of these buildings are unique in form and function, each expresses a fundamentally inseparable relationship between building and site, between transcendence and the circumstantial. Designed thirteen years after the Yale Art Gallery was completed, the Kimbell played a defining role in Kahn's ever-developing attitude about the synthesis of art and architecture. All of Kahn's buildings simultaneously explored ways to integrate structure, function, materials, and natural light, but the Kimbell Art Museum seemed to express an emerging desire to capture ambiguity as a positive, generative force in architectural design. This is due to Kahn's belief in discovery as an important part of design and experience. Always asking what a thing wants to be, Kahn sought to uncover the hidden truths lying dormant in existing conditions such as program and site. Moreover, design moves that initially seem ambiguous and contradictory in his work, often later reveal themselves as logical, multivalent, and ingenious architectural solutions. Therefore an analysis of pre-existing site conditions must first be tracked as a design force for the Kimbell Art Museum's location, relationship to adjacent properties, orientation, organization, landscaping, massing, and experiential ambiguities.

Unfortunately in previous studies on Louis Kahn, almost no attention has been paid to his site design strategies and planning ideas. The lamentable trend to overlook Kahn's site design sketches and the particulars of each building site has been pervasive. This partially explains why Kahn retains the somewhat aloof reputation of a genius who paid little or no attention to bothersome, circumstantial site characteristics.⁸ This persona was also fueled by Kahn himself, as he often poetically described architecture as a search for pure archetypal form liberated from design and circumstantial requirements. Thus historians have understandably placed great importance on Kahn's pure, abstract, geometrical plan diagrams detached from his recursive design process. Undoubtedly Louis Kahn's architecture drew its power and timeless presence from aesthetic purity, structural clarity, integration of all services, and legibility of plan organization, yet it was 'Form' that Kahn repeatedly voiced as the genesis of architecture.

Form is the realization of a nature, made up of inseparable elements. Form has no shape or dimension. It is completely inaudible, unseeable. Form precedes design. Form is what. Design is how. Form is impersonal. Design belongs to the designer. Design is a circumstantial act- how much money is available, the site, the client, the extent of knowledge. Form has nothing to do with circumstantial conditions. In architecture, it characterizes a harmony of spaces good for a certain activity of man. Form to me is this inner image. It has no shape. It has no dimension. It somehow reflects that which belongs to itself. It is a harmony of systems which belong to a thing. It is a sense of the order of things. Design is that which puts it into being. I don't believe in need as a force at all. Need is a current, everyday affair. But desire- that is something else again. Desire is the forerunner of a new need. It is the yet not stated, the yet not made which motivates.

Based upon these poetic words, it is understandable that much attention has been paid to Kahn's forms- as if they existed in a vacuum unspoiled by site, budget, clients, or any other circumstantial factors. Yet, in spite of his own rhetoric about Form as autonomous architectural essence, Kahn paid great attention to each site as an integral part of design. He also searched for design solutions by constantly re-thinking initial design assumptions based upon the particular problems of each design. Kahn illustrated his mandate for balancing poetics and pragmatics in a 1968 discussion with a client, in looking at how mechanical services of the Kimbell would fit into the general form, "If they (the guts of a building) don't fit in easily and properly, then we have the wrong form." This statement reveals a desire to discover design solutions that accommodate all components of architecture from the macro to micro scale, and also to reject those that do not. It would seem natural then, that site and design development played important roles in the search for final form at the Kimbell Art Museum. Indeed Louis Kahn patiently searched throughout his career for an architecture that transcended style, based upon a recursive process of asking what each thing wanted to be. The design process for Kahn was the pursuit of what *he considered* an inevitable solution, and for a complete synthesis of building and site, "Form and Design, the measurable and unmeasurable."

The design process was essential to how Kahn thought and labored to bring architecture into realization. The particulars of design problems helped Kahn guide and check his search for Form. Moreover, it was precisely his sensitive site design responses that made Kahn a master of architecture, capable of producing buildings of eloquent resolution. Site design was part of the reason why his mature works seemed immediately timeless, yet firmly rooted with a sense of place. Input and inspiration from his clients, budget constraints, site topography, vegetation, functional requirements, and the unpredictable nature of the design process were contributing factors for each of Kahn's masterworks. Ultimately, Kahn's architecture aspired to appear natural, inevitable, immovable, unalterable for all time, until ruin. But what has Kahn to do with origins or ruins? It is of course, the language of the contemplative, of the man who looks a long way back so that he may with confidence, look a long way forward.⁹

First and perhaps most important of all factors to be considered in the design process, site sensitivity was essential to the Kimbell Art Museum. For Kahn, a building had to respond to site-specific climate and topography, optimizing the possibilities that each site offered. This has always been a key to understanding the

timeless quality so often attributed to his late works- architecture is dependent upon, and yet transcends location. Kahn described the relationship between site and building by remarking upon Greek architecture and his ideas for Form and Design.

It is a decision coming from commonality that you choose a place out of all places to build, a place where others can also settle. It is a very important decision, of the same importance as the positioning of a Greek temple amongst the hills. Of all the hills, this hill is chosen for the temple, and then all the other hills beckon to it as if bowing to this decision. You do not see the hills now except as respecting the decision of the placing of this eulogizing building, which is remarkable in that it has never been there before. You cannot design anything without nature helping you.

Fond of alluding to the antiquities, Kahn often evoked designs that seemed to prove themselves not only as enduring and endearing buildings, but also possessed a comfortable fit with their surroundings. This may also have been a way for Kahn to combat the 'form follows function' hegemony prevalent in America during the 1960's, and to remind his colleagues that Architecture aspires to be a complete whole, not the sum of parts. His penchant for romanticizing ancient architecture placed importance on the spirit of architecture- an essence that remains meaningful through the centuries. Therefore Louis Kahn did not attempt to diminish the necessarily important influence of each site's characteristics that justified the very existence of architecture. (For example, one can hardly comprehend the pyramids outside of the climate, topography, geology, and available building materials of ancient Egypt.) Kahn tried to utilize the sites he was given to uncover the potential unique beauty of each, and activate his designs with their own voice, character, aesthetic and experience. The building pays startling allegiance not only to the director's well defined program, but also to particulars of site, climate, and regional character. Its ruggedness, flatness, tawny naturalness of surface and color, and especially the way it copes with the sometimes brutal sun make it part and parcel of where it is.¹⁰ It is remarkable that with the Kimbell Art Museum, Louis I. Kahn at the age of 65, realized a mysteriously rich architectural experience inextricably linked to a specific, physical place. Like other great art works, the Kimbell was a joy for me to experience, and a frustration to communicate to others.



12. South entry from Lancaster Avenue. The pathway simultaneously leads to holly trees and hidden museum entrance, creating an ambiguous destination. All exterior, processional routes seem to bypass the building and terminate in nature. An artificial horizon is suggested with the line of land/concrete base, and museum/travertine above, also evoking infinity.



12a. Marshall Meyers, Louis Kahn and Richard Brown in auditorium at the final inspection, August 3, 1972.

“THE IDEAL MUSEUM”

Kay Kimbell, a wealthy entrepreneur and businessman of the food industry and his wife Velma bought their first work of art- a painting in 1931. Five years later, together with his sister and her husband, Kay established the Kimbell Art Foundation. The collection expanded rapidly, albeit not in a consistently systematic fashion. By 1948, the collection was already on exhibition at the Fort Worth Public Library, the only location available in the city for this kind of event. The need for a suitable exhibition site soon arose, and led to the formulation of a new facility to serve the city. In 1964, following the death of Kay Kimbell and under the terms of his will, the Foundation acquired the necessary funds to construct a new museum. The city of Fort Worth allocated a plot of approximately nine acres in the Will Rogers Memorial Park, which already housed several public structures for art, performance, sports and agricultural exhibitions. Richard Fargo Brown, described as one of the most efficient and capable museum directors in the United States, and at that time the director of the County Museum of Los Angeles, was appointed to the administration of the Kimbell. His task was to manage the exhibitions and exhibits, and also to supervise the design of the new Kimbell Art Museum. Brown chose Louis Kahn as the design architect for the project, over John Johanson, Edward L. Barnes, Paul Rudolph, Gordon Bunshaft, I. M. Pei and Mies van der Rohe. Richard Brown cooperated closely with Kahn for the duration of the design up until the end of construction and opening reception. The production of the architectural contract documents did not proceed without difficulties, as problems arose between Kahn and Preston M. Geren's architectural firm in Fort Worth, the local company appointed by Brown. Project architect Marshall Meyers and structural engineer August Komendant were also primary contributors to the realized building. What resulted from the collaboration between architect, engineer and client moved Richard Brown to believe that the Kimbell could not be improved upon, and comment, "The Kimbell is what every museum man has been looking for ever since museums came into existence: a floor uninterrupted by piers, columns, or windows, and perfect lighting, total freedom and flexibility to use the space and install art exactly the way you want. The ideal museum is here, in Fort Worth."^{1a}

Experiencing the Kimbell Art Museum

The Kimbell Art Museum is one of the best buildings in the world, but one few people get to see. The Kimbell has received relatively little attention in newer histories of modern architecture. It is a building which should be physically experienced, and its location, neither East nor West Coast, may partially explain the neglect.

-Robert Campbell and Patricia Loud

The museum shows layers of richness and care, while simultaneously seeming simple, inevitable, and timeless. One of the indisputable master-pieces of 20th century architecture, the Kimbell Art Museum in Fort Worth exemplifies many of the key ideas behind the work of Louis Kahn. The building's simple, powerful forms- curving vaults that work equally well as gallery space, library, and auditorium- linger in one's memory.

-Mark Simon (jury chair of the AIA's 25-Year Award to the Kimbell)

The finished building was received with warmth and praise by public and professionals. The low palazzo scale and the repeating, cycloid-vaulted profile struck an emotional chord with laymen (whose favorite architectural form is undoubtedly the arch), and the articulated materiality of concrete, marble, glass, and sheet metal in a sublime concert of proportion and the luminous, spatial magic of the interior enthralled architects. A huge cry from the architectural community went up in the late 1980's when plans to enlarge the building (with architect Romaldo Giurgola), by extending its vaulted extrusions were revealed, and later abandoned. May the integrity of Fort Worth's treasure be preserved.

-Frank D. Welch

The Kimbell may be seen as the apotheosis of Kahn's career, above all for the way in which one dominant tectonic element, namely a barrel vault, determines the overall character of the piece. The other determining factor is a stereotomic earthwork, here the manifest integration of the building into its site.

-Kenneth Frampton

The Kimbell Museum's candid materiality, its tectonic clarity, and its scrupulous absence of applied ornamentation have won it high esteem in modernist quarters. It safely eschews the irony, juxtapositions, and overt humor of the postmodernists in favor of a convincing cohesiveness and unity that the modernists admire. The building scorns labels. But if the Kimbell Museum is hard to label, it is not difficult to describe. It is powerful, awesome, and inspiring. It is sincere, warm, and humane. It is truly one of the great buildings of our time.

-Lawrence W. Speck

The whole plan of Kimbell is based on a room-like quality, and the natural light as being the only acceptable light. A painting that you don't see as well one day as you do another has a quality which the painting itself wants you to realize. It doesn't want you to have a one-shot image of it, even it was painted in moods. This building *feels*, and it is a good feeling, that I had nothing to do with it, that some other hand did it.

-Louis I. Kahn

Experiencing the Kimbell Art Museum:

My Narrative

I can clearly remember my much anticipated visit to the Kimbell Art Museum. Already somewhat biased by previous study on the building from numerous publications, I finally arrived at this building, eager to experience it first-hand. The day was hot, clear, and sunny; the blue sky was adorned with fluffy white clouds. The glaring Texas sun was in its zenith. Trees and shrubs wore a brilliant summer green and were inhabited by a wide variety of birds including the very lovely and rare Birds of Paradise. It was a perfect day to visit this Kahn masterpiece at last.

I had parked the rental car on Will Rogers Road West in the shade of trees lining the sidewalk, and my first view of the complex was on a garden paradise, and certainly not on the building itself. Indeed, the building could scarcely be seen from any of the surrounding roads, as if obscured for surprise and discovery. Of course I had studied the Kimbell via numerous books prior to my visit, but was shocked that I could not see the building at all from the garden side. Not shown in published photographs, the building was totally hidden from view on West Drive. This relationship between building and landscape came as a surprise; most architects have predictably tried to make public buildings as prominent and monumental as possible, and Kahn was no exception. Kahn's well-known penchant for monumental buildings such as the Yale University Art Gallery of 1953, the Alfred Newton Richards Medical Research buildings of 1961, The National Capital of Bangladesh begun in 1962, Eleanor Donnelley Erdman Hall at Bryn Mawr College of 1965, Salk Institute for Biological Studies of 1967, Phillips Exeter Academy Library of 1971, and The Yale Center of British Art of 1974 led me to anticipate a similar, imposing solution in Texas. But unlike many of his other works, the Kimbell seemed to depend upon the surrounding vegetation as a camouflage for this little jewel of a building.



13. Expansive front lawn with trees screening the Kimbell Art Museum from view on West Drive.

14. View looking north down colonade of trees in front garden adjacent to grass lawn with signage on Lancaster Avenue.



I then walked across an expansive lawn that separates the grove of trees that screens the front porches of the building. As an initial observation, the sensitive, even sensual site design touched upon my interest in the delicate relationship between natural and man-made environments. The design prompted me to experience the complex on its own terms, for myself, released from published documentation and critique. This was my immersion into what Kahn has described as “A building is a world within a world.” The surrounding trees and shrubs created a living wall, that effectively filtered both the intense sunlight and traffic noise of Fort Worth. I soon realized that the landscaping and architecture merged and reinforced the feeling of a completely autonomous environment, detached from the cares of the outside world.

15. Pedestrian pathway mediating between alley of trees and building in the front garden. Tree canopy provides shade and enclosure similar to building vaults.



Within this micro-world lay numerous choices of experience, just waiting to be discovered. There were several inviting pathways leading through the complex, and I had to choose one. These wide pathways cut across the site and around the museum, often bypassing the building completely. Almost like a labyrinth, the end destinations of these routes could not be determined as they changed horizontally and vertically to disappear from view. I could not immediately determine whether it was better to enter the museum from the garden side or lower level automobile entrance. The layout of paths around this building yielded a casual, human scale completely contrasting with the surrounding, monumental public buildings.

A walk around the side of the building and away from the garden yielded a startling contrast in imagery. I had passed the expressive side elevation of the building on Camp Bowie Boulevard, and was not prepared for the vapid, mute and perhaps even ugly elevation on the lower level facing Arch Adams Street.



16. Pedestrian path meets vehicular street. Tree located in center of path blocks views to and from the busy Camp Bowie Boulevard.

Appearing more like a rear loading or shipping and receiving area, the lower-level entry had an uncomfortable solidity and heaviness. There were no windows or visible doors, just a dark subtraction from the mass of the building that seemed to indicate entry. I remember not wanting to enter here; this entry was a jarring disappointment. Automobiles were aggressively parked adjacent to the building in a manner similar to shopping malls and convenience stores. Was this the back or the front of the museum? Why would anyone design the main museum entry like this? Was the building trying to attract or repel visitors? This was the entry where eighty-five percent of all museum visitors enter, perhaps not aware of the garden entry. The scale seemed super-human, brutal, and intended to be viewed from afar. Unlike the garden pathways, nature was absent from the experience of a building located in a park setting. The automobile had thoroughly conquered the utilization of available land around the building, yielding a cold, mute, barren environment.



17. Lower level entry from Arch Adams Street. Large opening is automobile drop-off area. Size of opening is 100'-0" by 11'-8."

I wondered if Kahn was attempting to communicate something about how we should move towards, into, through, and out of a building. Was Kahn making a personal statement about architectural experience, imagery and entry? Perhaps there was a veiled lesson to be learned, and a little exploration was warranted. I walked around to the side of the building that faces West Lancaster Avenue. It was then that I noticed steps which led from the parking lot to a small grouping of trees adjacent to a sunken sculpture garden. Following this path led me back through a carefully designed path to the garden front and entry porches.

18. Southeastern corner of building and visitor parking. Shape of hedges compliment building profile.



Feeling that I had stumbled upon something significant, I retraced my steps back to the lower level parking lot and walked around to Camp Bowie Boulevard. Here I saw how Kahn had offered a way for even the employees to access the garden porches. It seemed that everywhere in the Kimbell complex, the focus was on nature and the garden. Some routes were intimately scaled for one or two persons, and others possessed a majestic, even heroic scale. All exterior paths reinforced a sense of direction in relation to the sun, and to the overall massing and appearance of the building. Elongated, straight pathways led directly from adjacent side streets to the garden porches, and short, compressed routes served as connectors. The layout of both the building and the landscaping had a graining, or directionality that was discernable. This was a design that seemed to simply grow out of the site; the Kimbell Art Museum could not have existed on any other site. All of these routes of circulation moved up and down from the lower to the upper level, making the slope of the land more legible. At that point in my visit to the Kimbell, I realized that the building was one to be explored and savored at a leisurely pace. Great care was taken by the designers to make sure that the entire site and building could be completely circumnavigated. The Kimbell was presented as a puzzle or riddle, waiting to be unraveled.

19. South garden steps lead up from visitor parking, through a grove of trees to southern amphitheater.



20. Steps leading up from north employee parking area to entry porch and garden.





21. Ambiguous entry from garden is hidden from view by Holly trees. Tree canopy continues the roof cover and shelter of building.

Perhaps my experience of moving around the building was analogous to Kahn's poetic, often confusing and ambiguous descriptions of architecture. I remembered that Kahn almost never focused undue attention on buildings as commodities, but rather held architecture to the highest standards of art, emotion and spirituality. Perhaps there was a connection between what Kahn said about the Kimbell, and how the building should be experienced. I realized that there were four distinct pathways into the Kimbell, all yielding a different first impression, if not experience and subsequent reading of the building. Each pathway addressed a different side of the building in a variety of experiential relationships to the gardens and the architecture. Indeed, the approaches to the building revealed the dichotomy between the man-made and the natural, inside and outside, between the measurable and unmeasurable. I can clearly recall the excitement and sense of expectation and investigation that the Kimbell caused within me, and amazingly, I had not yet entered this museum of relatively diminutive proportions: 318 feet long, by 174 feet wide, and a mere twenty feet tall.



22. Grid of trees at garden entrance creates an intimate hall that filters harsh sunlight. Destabilizing gravel underfoot slows circulation and signals a transition from outside to inside.



*In everything that nature makes,
nature records how it was made.
In the rock is a record of the rock.
In man is a record of how he was made.*

*When we are conscious of this,
we have a sense of the laws of the universe.
Some can reconstruct the laws of the universe
from just knowing a blade of grass.
Others have to learn many, many things
before they can sense what is necessary
to discover that order which is the universe.*

*The inspiration to learn comes from the way we live.
Through our conscious being we sense the role
of nature that made us.*

23. North entry from
Camp Bowie Boul-
vard expresses vault
units, overall building
configuration and the
dramatic slope of site.

Louis I. Kahn, 1964
Talks with students
Rice University

THE ART OF AMBIGUITY

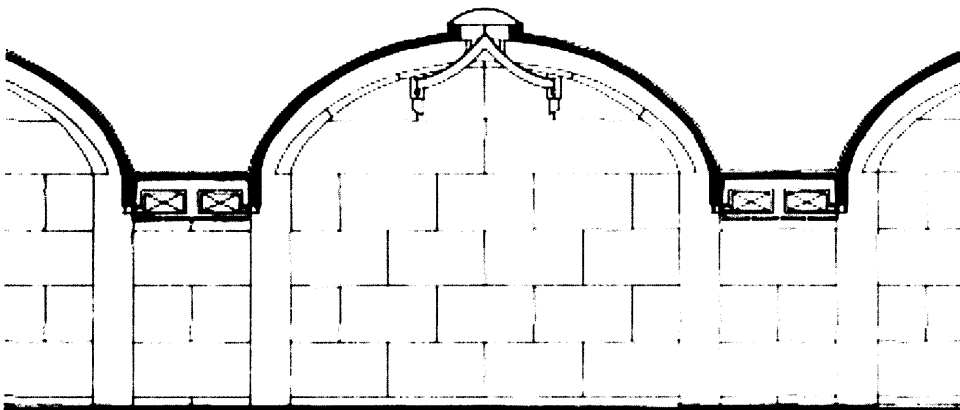
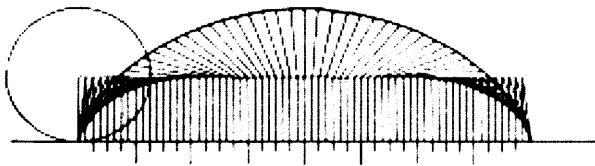
*This is the realization of the nature of a realm of spaces
where it is good to do a certain thing.*
Now you say there are some spaces
You know should be flexible.
Of course there are some spaces which should be flexible,
but there are also some which should be completely inflexible.
*They should be just sheer inspiration
...Just the place to be,*
the place which does not change,
except for the people who go in and out.
It is the kind of place that you enter many times,
but only after fifty years you say,
'Gee, did you notice this... did you notice that?'
It is an inspiring total,
not just detail, not just a little gadget
that keeps shouting at you.
It is something that is just a kind of heaven,
a kind of environment of spaces,
which is terribly important to me.
A building is a world within a world.
Buildings that personify places of worship,
or of home, or of other institutions of man
Must be true to their nature.
It is this thought which must live;
if it dies, architecture is dead

Louis I. Kahn, 1964
Talks with students
Rice University

Experiencing The Kimbell Art Museum

PART TWO

The Site Design



[illegible]

25. Aerial view of Kimbell site with Amon Carter Museum in foreground and the Will Rogers Memorial Complex on the right, 1969.

Part Two: Site Design

Pre-existing Conditions

The site analysis for the Kimbell Art Museum is where Louis Kahn's first moves to create ambiguity occurred based upon numerous pre-existing conditions. As can be seen in the 1966 map of Amon Carter Park, the site for the Kimbell was once divided in two by a cross road labeled East Drive (fig. 24). Once aligning and terminating with the center of Will Rogers Memorial Coliseum, East Drive was closed by the city of Fort Worth to clear a large swath of land upon which the Kimbell could be built. All rearrangements and services related to the removal of East Drive were financed by the Kimbell Art foundation prior to Kahn's involvement, and his design expertise. Seemingly ordinary, this turn of events in the history of the museum's design prompted what would develop into a highly powerful design feature in the later realized building. The trees that once lined East Drive and framed an axial view to Will Rogers Coliseum, no longer served a clear function once the street was removed. A grove of six rows of trees- another remnant of previous design plans, also existed at the time Kahn received an initial packet of information about the site and program on June 13, 1966 from Dr. Richard Fargo Brown, the Director and a trustee of the Kimbell Art Museum. The site, as presented to Kahn, basically consisted of a large grass lawn bounded on the west by tall, hardwood trees defining West Drive, and bisected east west by a colonnade of trees leftover from East Drive. The site for the Kimbell Art Museum was singular because it was well-defined by the surrounding streets- (Camp Bowie Boulevard to the north, Arch Adams Street to the east, Lancaster Avenue on the south, and finally West Drive), and simultaneously plural- one an open grass lawn on axis with the tower of will Rogers Memorial Complex, and the other partially planted with trees to the south, and the two were bisected by a double row of mature trees (fig. 25). Therefore Kahn was given a site that was inherently ambiguous; it was both singular and plural in its layout. This duality of readings about the site would inform Kahn's design process, and remain a prominent feature in the realized building.

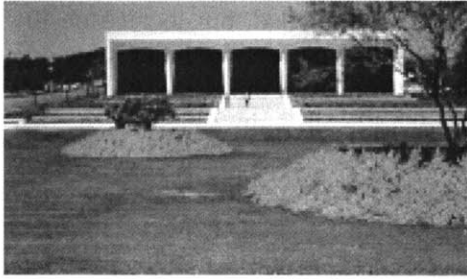
Due to its axial relationship with the Will Rogers Complex, the Kimbell site contained a strong north-south orientation and directionality (which will be referred to as graining). This is a significant point- the Will Rogers Complex served as a vertical and cultural landmark for the park, as well as the general vicinity of Fort worth. The Memorial Tower is the tallest building in the park at 208 feet, and is clearly visible from a radius of several miles.¹¹ The coliseum and auditorium are also very prominent buildings- the auditorium seats three thousand and the 250' by 125' coliseum seats nine thousand spectators. These buildings continue to accommodate various events such as garden shows, winter sporting events, lectures, concerts, conventions and art exhibitions. The Will Rogers Complex therefore served as the cultural and artistic center of Fort Worth, and provided a well-defined anchor at the southern end of the alley of trees running through the center of the Kimbell site.¹¹ The center alley of mature oak trees and the trees on the north and south periphery of the site provided clear boundaries for the Kimbell, and also established vistas open from the west, and terminating across Arch Adams Street with the Will Rogers

Complex. Running across this grain of trees, the site contours sloped from west to east, away from the Amon Carter Museum towards downtown, and produced a fifty-foot drop across the site (Appendix 3, III, C).

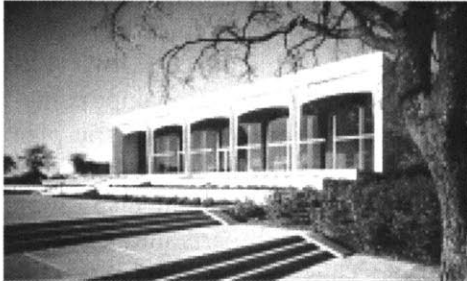
Located to the west of the Kimbell site and on a higher elevation, the Amon Carter Museum commanded views towards the downtown area that had to be maintained, according to the program sent to Kahn (fig. 26). The impact of this criterion immediately suggested several design responses: a low-lying building would not compromise the view from the Amon Carter Museum lobby, Kahn's building could be taller if placed on the lower elevations on the eastern side of the property, and the Kimbell Art Museum might best function as a two-story structure accessible on both levels. The Amon Carter building was positioned perpendicular to the Will Rogers Complex and closest to the Kimbell site in terms of distance. As can be seen in the photographs, the Amon Carter Museum sits on the high side of its site to create an open court in front of the building with a monumental, indeed classical entry sequence (figs. 27 - 30). Assurances were also made by the Foundation that the Kimbell design would harmonize with the Amon Carter Museum complex, since it defined the southern edge of the Kimbell site. Kahn's design thus had to harmonize, even defer to Philip Johnson's Amon Carter Museum to the west in terms of height, visibility and appearance.¹²

26. Aerial view of Kimbell Art Museum site. Amon Carter Museum in foreground and downtown Fort Worth in the background, 1969.





27, 28. Amon Carter Museum entrance over cascading steps. Downtown towers clearly visible in the distance, 1961.



29, 30. Amon Carter Museum entry steps and portico. View from lobby looking east towards downtown Fort Worth, over Kimbell site, 1961.

Potentially open-ended visually and benefiting from lower contour elevations, the eastern side of the Kimbell site suggested an important entry on that side of the future museum. Bounded by low-lying residential and storage buildings of no significant architectural design, the eastern properties initially had a minimal impact in terms of the hierarchy of adjacent site influences. This is a point that will become more relevant as other ideas about Kahn's design process are discussed, but it is worth identifying now as a developing site influence. Physically closed on the west and south by significant public buildings, and experientially open on the north and east by Camp Bowie Boulevard by residential and storage buildings, the edges of Kimbell site were thus well-defined. Towards the east the site was semi-open to downtown, at least conceptually, because of adjacent, low-rise buildings located on lower contour elevations. Not only was it possible for the Kimbell to make some connection to the downtown area to the east, it was also possible for the museum to project a commanding, monumental presence from the east if structures on adjoining properties were removed. Judging from the precedent established by the Amon Carter Museum to the west, it may have seemed prudent to create an open green-space in front of the Kimbell appropriate for an art museum. Moreover, an open green space in front of the museum could take advantage of the relatively horizontal nature of the surrounding Fort Worth area, and create a strong relationship between building and location.

Additionally there were three other minor, existing site characteristics that would play a defining role in the final design and experience of the Kimbell. First, the experience of entering the site through a grove of trees on the south side of the site, would reappear in the final design- reinterpreted and scaled for the building. These evenly spaced trees can be seen in the photograph (fig. 25) closest to, and diagonally located from the geodesic dome. Consisting of six neatly planted rows of trees, the grove also represented order imposed by man upon natural, organic elements. This site feature could have been read as ambiguous- a blurring of the natural and man-made, and repetitive order out of unique elements. A second minor site

influence was a perpendicular intersecting road (not labeled, but located on the right side of the map), that terminated with Arch Adams street on the existing site plan. This tree-lined street was of secondary importance to the existing lawn that the museum would later occupy, but it became an influential site characteristic that would help inform and organize the museum. Bisecting the semi-open area to the north of the Kimbell site, this road was delineated by rows of mature trees that could serve as an appropriate entry corridor for the Kimbell. However the full potential of this street on the experience of entry and arrival for Kahn's masterpiece is still unrealized, yet clearly it was of significant importance for Kahn, as will be shown later. The existing site plan shape was the third characteristic that influenced Kahn's design process. In terms of geometry and simple shapes, the Kimbell site could have been read as a rectangle and triangle attached, two rectangles divided by the center alley of trees, an irregular polygon, or an approximation of a square in plan. Kahn certainly paid great attention to geometric plan shapes, and would have recognized the multiple readings possible about the site he was given. "The geometrical structure of the ground plan figures, the disposition of the component figures and the presumed integration of all parts into a greater whole are examined in two-dimensional contexts. Thus we discover that Louis Kahn's design principle is to build architecture up by using a dimensional and geometrical structure."¹³ This does not seem to be a major influence here on the level of site analysis, because of the irregularity of the site boundaries. A resultant of Camp Bowie Boulevard on the diagonal to the general orthogonal grid and layout of Fort Worth, Texas, the trapezoidal shape defies division other than into a square and triangle. But the simultaneous reading of the site as both a square and rectangles, centralized and elongated, static and dynamic originates within the site proportions. However, Kahn did not feel obliged to cover or even utilize the entire site, as evidenced in his first design proposal. When considered together, the site contours, the parallel rows of trees within and around the site, and the buildings on adjoining properties prohibited and simultaneously provided opportunities for design. These existing site conditions reinforced directionality and layering, or an east-west 'graining' that would be later identified and exploited. The double reading of the existing area allocated for the Kimbell Art Museum as a well-defined singular site, and as two sites divided by an alley of trees down the middle parallel to its longest side, should thus be regarded as a generating factor for the dualities that were studied in the design process. Clearly the site chosen for the Kimbell Art Museum was already charged with ambiguous readings before Kahn began designing- ambiguities that he would later utilize to their full potential.

You are born with nature's approval at a moment that is different from any other moment. Nature gives to everything both measurable and unmeasurable qualities. In the measurable every moment is different, but your spirit is the same. Nature gives everything to you non-consciously, and you, from nature, get consciousness of the Spirit.

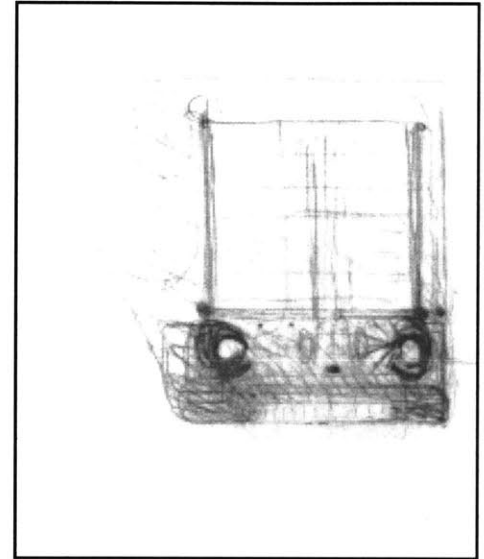
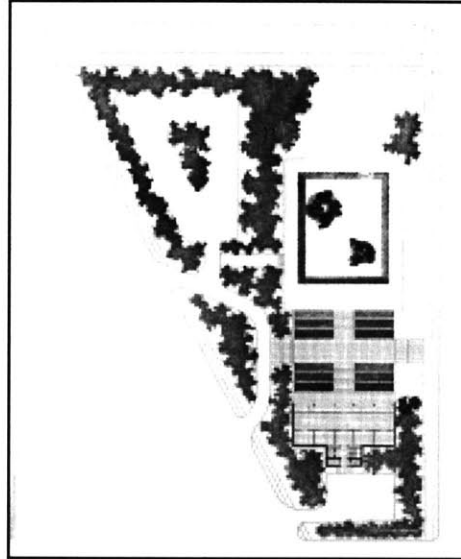
Initial Site Design

Six months after signing a contract with the Kimbell Art Foundation for design services, Louis Kahn presented his initial ideas for the Kimbell Art Museum in the spring of 1967. His first production consisted of preliminary sketches, and a scale model at 1:1200 showing the overall building mass and form positioned on the site. Designated the 'Square Plan,' Kahn's first design proposal was quite literally a square-shaped building, occupying most of the available site area closest to Will Rogers Memorial Complex. This location placed the building away from the potentially problematic traffic noise and triangular geometry of Camp Bowie Boulevard. In addition to carefully examining the map, photographs and program statements sent by Richard Brown (Appendix 3, III, B), Kahn seriously considered the site's limitations. *"Rather ordinary two to four story apartment structures, and decidedly unattractive small one to two-story business and shop buildings lie across Camp Bowie Boulevard on the north. This surround, combined with the low-lying nature of the site, poses a design problem; there is no outward vista, and the elements of lowness and flatness will have to be utilized for positive effect. Inward orientation and an imaginative garden treatment in relation to terraces and/or building platform will be important."* Although the Kimbell site was judged to be problematic from the outset, Kahn would surely have been sensitive to discover and reveal the site's potential. Explored simultaneously through form, light and building organization, the site was carefully analyzed to ensure a harmonious fit with the landscape and surrounding buildings.

Relating the Kimbell design in numerous ways to topography and vegetation, Kahn carefully considered Philip Johnson's Amon Carter Museum site planning. First of all, adequate open space was maintained on the Kimbell site directly in front of the Amon Carter to provide a necessary visual and spatial separation between the two museums (fig. 24). By pushing his building back away from East Drive, Kahn also provided necessary 'breathing room' between the two autonomous, public institutions. Additionally, the open courtyard in front of the Amon Carter would have been complimented across the street by a perpendicular court in front of the Kimbell Art Museum. Entry into both buildings would also have faced each other, although asymmetrically. Second, Kahn's initial low-lying scheme deferred to the Amon Carter's commanding eastward vista towards downtown. Located as close as possible to Arch Adams Street and the lowest site contours on the east, Kahn's initial placement suppressed the height of his building in relation to the Amon Carter Museum. The Kimbell design had a uniform, horizontal appearance that would not infringe upon views out of the Amon Carter towards downtown, or towards Memorial Tower from Camp Bowie Boulevard. Louis Kahn's treatment of the site was therefore sympathetic to Philip Johnson's design by taking the opposite approach; the Amon Carter Museum was located on the highest elevations of its site, and the Kimbell Art Museum was located on the lowest contours (fig. 25). The Kimbell Art Museum was therefore placed as far away from the Amon Carter as possible. The third relationship to Johnson's design was Kahn's parking solution for the Kimbell. Placed on the triangular area closest to Camp Bowie Boulevard, most of the parking for the Kimbell occupied land leftover from the building and existing trees. Like Johnson's building, the Kimbell would be buffered from the boulevard

by parking, yet simultaneously exposed on that side. This response allowed both Philip Johnson and Louis Kahn to maintain an orthogonal, pure geometry for their buildings, and to fill the irregularly shaped area with parking (fig. 31). Although Kahn had to fit parking spaces for 100 cars on his site, the Kimbell was pushed back slightly from Lancaster Avenue to align with the southern edge of the Amon Carter Museum. However, the overall massing and shape of Kahn's first design contrasted with Johnson's, and established a strong, figural, horizontal presence.

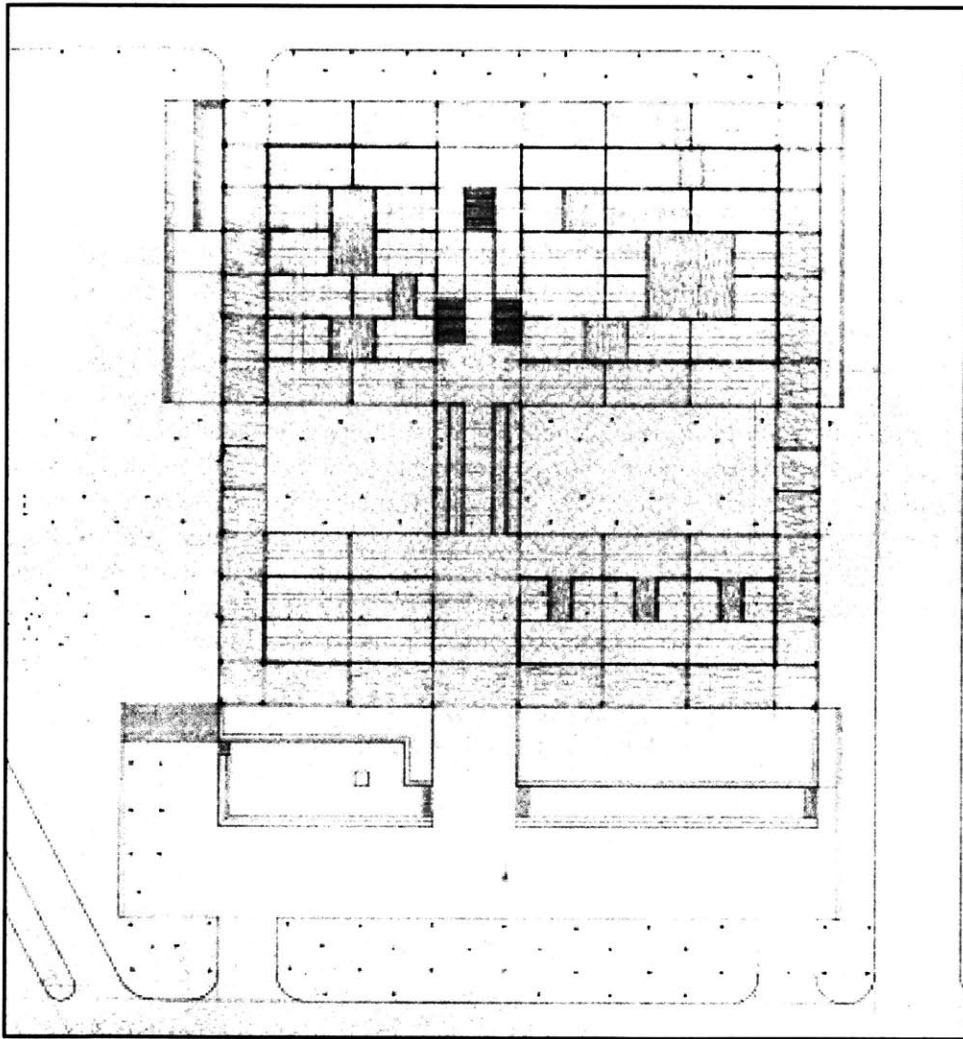
31. Site plan by Philip Johnson for the Amon Carter Museum, 1961. Area on left is main parking lot. Rectangle in front of museum is a sunken lawn with two trees and sculpture. A wide path parallel to the building, connects Lancaster Avenue with Camp Bowie entrance drive



32. First plan sketch by Louis Kahn for Kimbell Art Museum, showing a square as the first shape. The area to the left of square is parking and existing trees. Dark, horizontal line in center of square represents both site and building divisions- top two quadrants would be for permanent galleries of museum and bottom ones for temporary exhibits, minus the passageway of trees on site. Dark vertical line in center of square acknowledges the axis of street perpendicular to Arch Adams (see site plan), but not axis of entry. Dark area at bottom would be used as an open plaza, and some additional parking. In this sketch, Kahn stabilized the site by defining the four corners and center of the square plan, 1967.

The square shape of Kahn's first design with its appropriation of existing trees acknowledged the inherent site geometry. As previously mentioned, the Kimbell site was directional, longer than wide and oriented north-south. The site was also well defined by surrounding trees at the periphery to the east and west. In general, mature trees enclosed a large, trapezoidal shape bounded by roads on all four sides. Attuned to geometric shapes and order, surely Kahn would have recognized the overall trapezoid as well as the possibility of splitting that into rectangle and a triangle. Basic geometries of the site would have influenced Kahn's search for Form, as surely as all other site related concerns (fig. 32). throughout his career, Louis Kahn used geometry to inform many aspects of his architecture such as column locations, wall openings, structure and plan organization, but unfortunately this point has sometimes been misunderstood. As the preeminent architectural scholar Kenneth Frampton wrote, "Kahn's penchant for embodying institutions in arbitrarily geometric plan forms had its limits."¹⁴ Still, the essential importance of order and the rigor and resolution of Kahn's mature work has been consistently attributed to his insightful mastery of geometry. Many of Louis Kahn's designs started with basic, geometrical relationships that could be informed and deformed by the particulars of the design process. For this reason, it was only natural for Kahn to begin with a square shaped building placed on the side of the site that most resembled a square. Likewise, his initial response to the alley of trees that bisected the site into two parts, not only preserved this existing natural feature but revealed its potential power. By allowing the central alley of trees to coexist with the building, Louis Kahn ingeniously juxtaposed the natural and man-made together into a unified composition. It was precisely because of the building's square plan that Kahn was

able to claim and activate the Kimbell site with a powerful design, while respecting the views from the Amon Carter. The initial square building that Kahn proposed not only revealed his desire for order in his architecture, but also established order on the site. Kahn's initial move to produce a square that was simultaneously, and curiously, two rectangles showed his recognition of the site's embedded geometry and order. With the very first design response for the Kimbell Art Museum, Kahn embodied both the static and dynamic, singular and plural readings of an ambiguous site. The Kimbell site was not only surrounded but simultaneously bisected by rows of mature trees. Consequently, the first design appeared expansive on the exterior, and concurrently, intimately human-scaled from within.

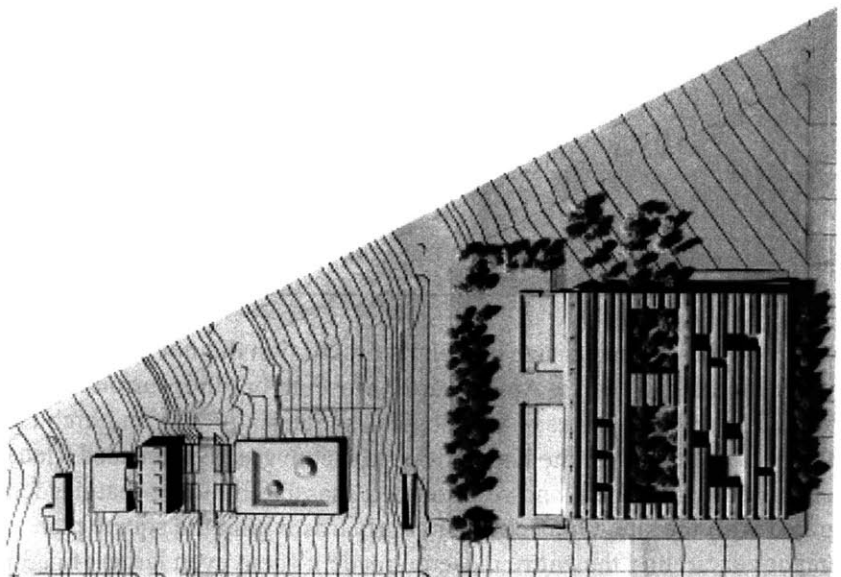


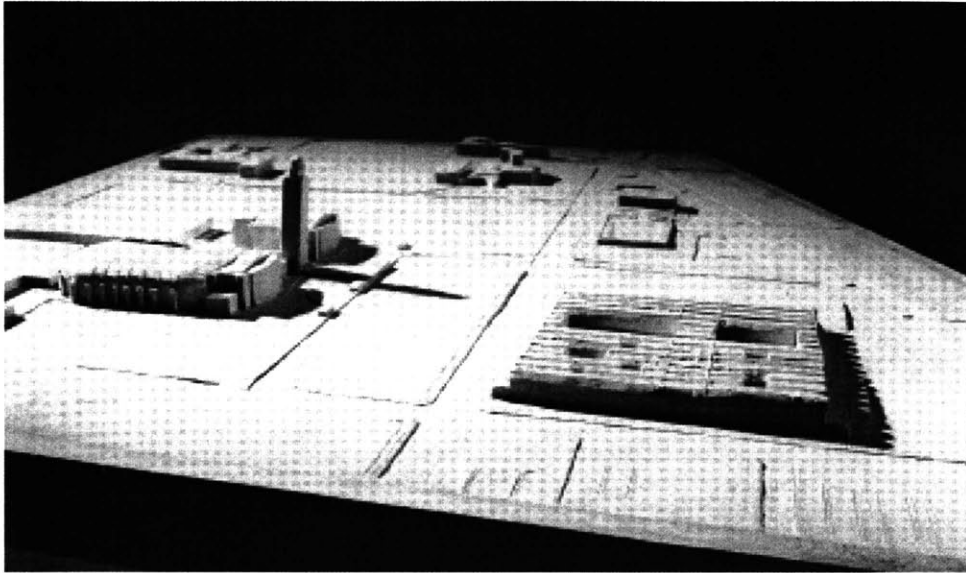
33. First drafted plan of the Kimbell Art Museum shows ambiguous reading of plan—both a square and two rectangles in unison. The existing passageway of trees is captured by building. As Patricia Cummings Loud described on page 111 in her book, titled *The Art Museums of Louis Kahn*, “In the plan it can be seen that the square shape of the whole is due to the arcade.”

Although the enormous size of Kahn's first design did not initially seem to harmonize with the scale of the Amon Carter Museum or other surrounding structures, it revealed a consistent, sensitive, logical synthesis of site and architectural form. Kahn's first design for the Kimbell Art Museum greatly exceeded Richard Brown's targeted program area, and resulted in a massive building that needed to be integrated with the site. Open exterior courtyards within the square plan, and covered arcades encircling the entire museum made it seem even larger (fig. 33). Yet these

exterior spaces opened the museum up to the site, and encouraged a porous relationship between building and landscape, while simultaneously responding to the Texas climate (fig. 34). The exterior porches and arcades also communicated with Louis Kahn's other works designed at the same time, recalling those he employed to counteract the light and heat of Ahmedabad and Dacca. The Kimbell design was primarily horizontal in nature to equally distribute natural light into all galleries, and to harmonize it with the surrounding buildings and contours. Amazingly, Kahn's design illustrated uncommon restraint and modesty, for a public art museum of this size placed on a suburban site. Indeed there were no new vertical markers to compete with Memorial Tower, or expansive courts competing with the Amon Carter Museum (fig. 35). The large Kimbell building footprint was a consequence of Kahn's intention to maintain a respectful, low profile for the new museum, and to capture natural light from above. Also in deference to adjacent properties, Kahn's building did not disturb trees aligning the property on the eastern and western edges. The existing, mature trees produced a vegetative screen for the new building on the east, and for additional parking to the west. Here Kahn revealed dual site responses—the building was kept low, horizontal and screened by trees on the east and west, and exposed on the north and south. These two site responses perfectly corresponded with the orientation of the museum as well. All end conditions of the vault-like units that comprised the overall building were celebrated, and the long sides of the vaults were screened behind trees. (It is worth noting here that there was a discrepancy however, between the two models presented during the spring of 1967. The clay massing model exhibited a rhythmic, arched building profile which expressed the vault ends, as evidenced by the shadows. However the subsequent, larger-scaled cardboard model showed a straight, horizontal roof profile masking the individual reading of the vaults. This horizontal roof image was apparently achieved by utilizing load-bearing end walls to support the vaults. All of these bearing walls were located perpendicular to site contours, and the existing rows of trees.) Hence, it was clear from the beginning of Kahn's design process that vaults oriented north-south, were a generative force in the Kimbell museum design, as well as the relationship between building and site (fig. 36).

34. Model of first scheme, illustrating Kimbell and Amon Carter Museum with the topography, 1967. Initial size of museum was four-hundred-foot square.

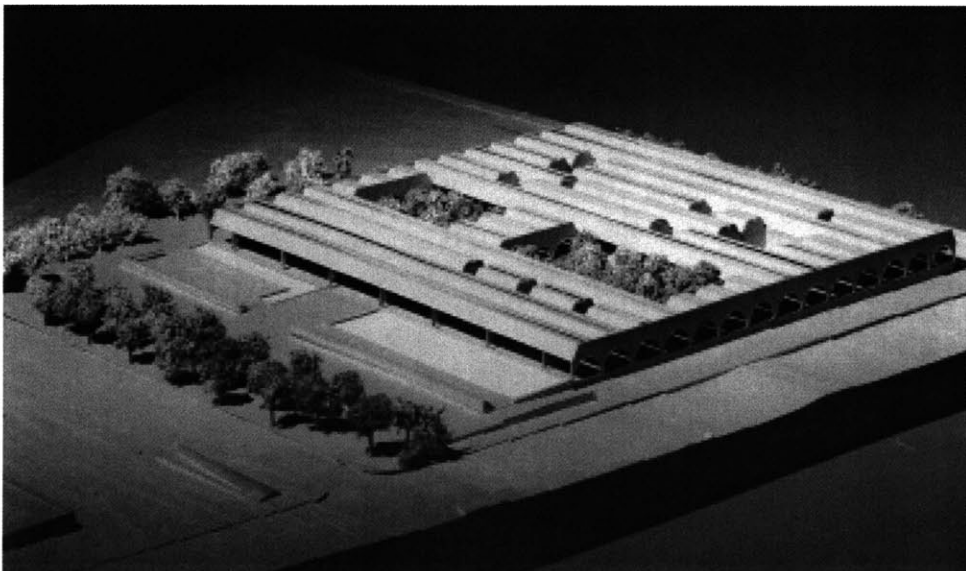




35. Clay site model with Memorial Tower on the left and Amon Carter in Background. Kimbell building footprint is considerably larger than other public buildings in the park, 1967.

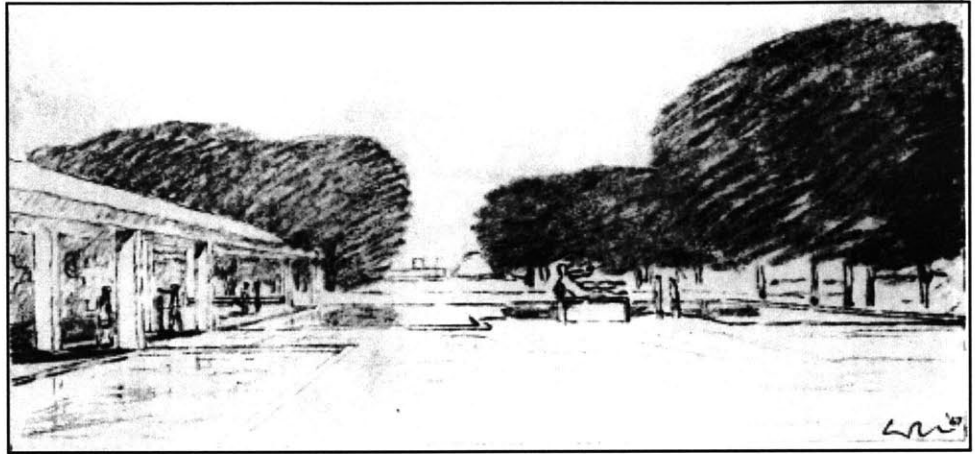
Architecture can be said to be the thoughtful making of spaces. The Pantheon was a marvellous example of space projected out of desire to give a place for all worship. It is expressed beautifully as nondirectional space, where only inspired worship can take place. Ordained ritual would have no place. The ocular opening in the top of the dome is the only light. The light is so strong as to feel its cut.

“I always start with a square, no matter what the problem is.”¹⁵ -Kahn



36. Close-up of topographic model showing building forms oriented with the site slope. Central lane of trees embedded within the square plan shape.

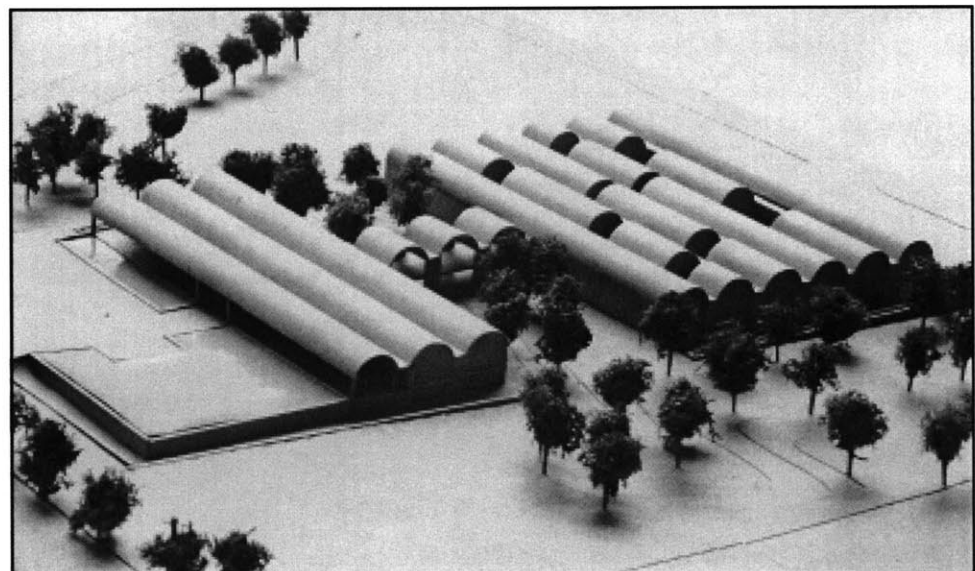
37. Perspective view of 'H-Plan' scheme, with entry plaza, pools and sculpture looking south. Layout of plaza and pools is asymmetrical. Kahn shows low, vaulted form parallel to line of trees to create a vista to Will Rogers Memorial Complex in the distance, fall, 1967.



38. Perspective view of 'H-Plan' scheme by Kahn, showing garden entrance obscured by trees. Building fits in among three layers of trees- the foreground trees at West Drive, trees in background on Arch Adams, and alley of trees bisecting the site and building. A relationship between tree canopy and vault canopy is suggested in terms of vertical supports and human scale, fall, 1967.



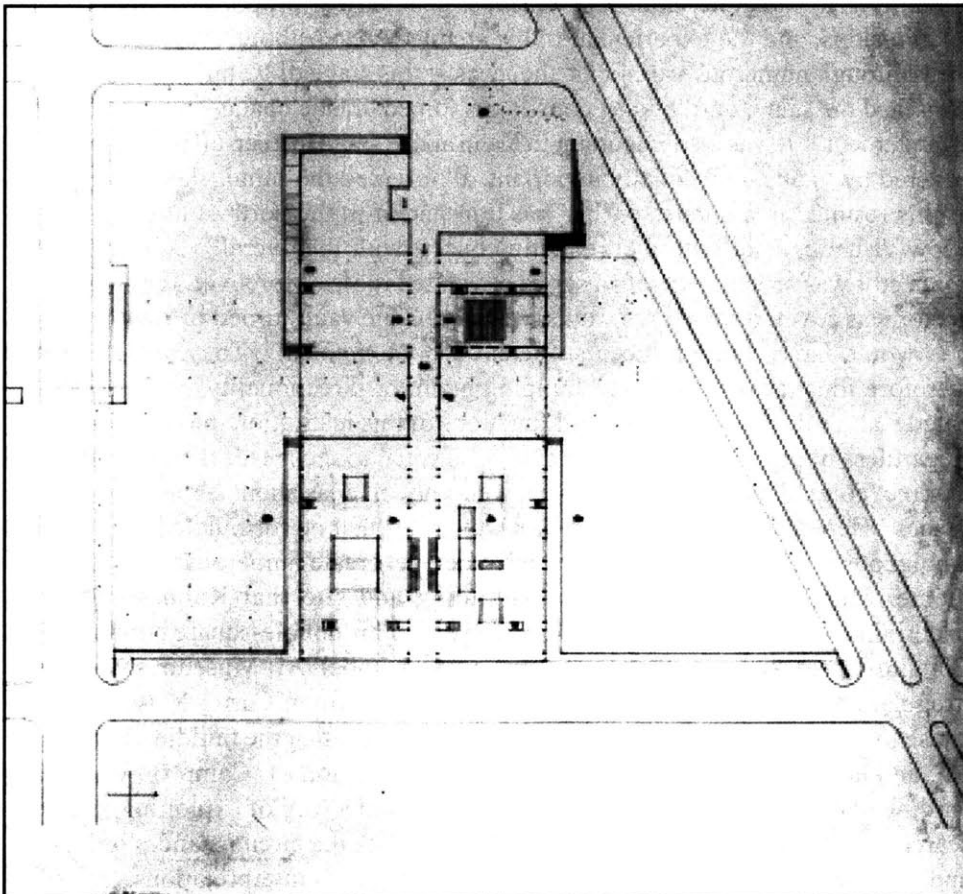
39. Cardboard model of 'H-Plan' scheme fall, 1967. The plan is divided with distinct parts linked by narrow, vaulted connector. Entry plaza and reflecting pools combined with three-vault mass to form a square in plan.



Site Design Development

The “H-Plan” of 1967

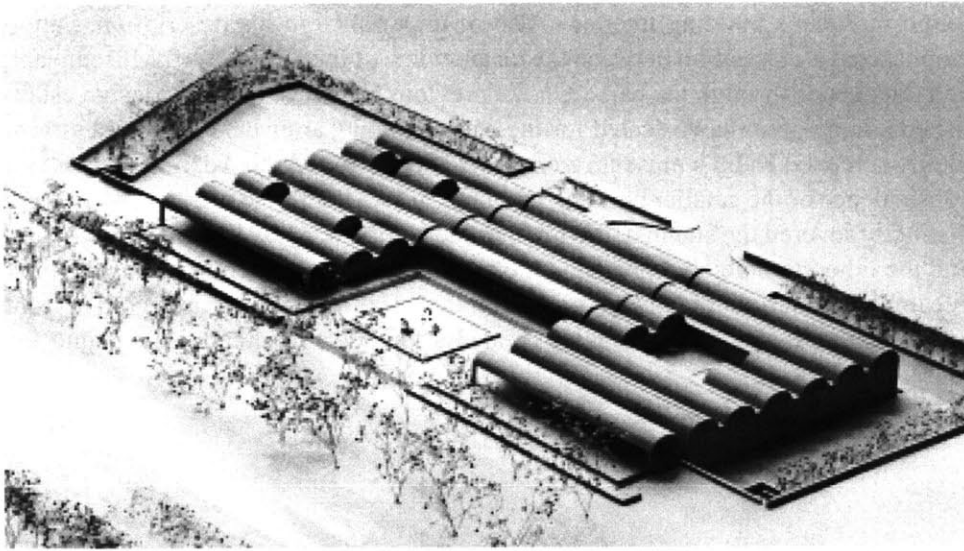
During the design process, Louis Kahn tested his initial site assumptions with two subsequent schemes, and the first of these was commonly known as the ‘H-Plan.’ This plan takes its name from the obvious shape of the building. The ‘H-Plan’ enhanced the existing site division formed by the central lane of trees. This move not only illustrated Kahn’s reading of the site as directional, but also expressed directionality within the building layout. Most essential to the experience of a museum integrated with the garden, Kahn changed the first square shape to a more dynamic, overall layout. This new arrangement responded to site boundaries and the powerful presence of trees bisecting the Kimbell site. Moreover, the revised scheme reinforced the experiential qualities of an ambiguous site. As previously mentioned, the Kimbell site possessed qualities of singularity and duality simultaneously. Perhaps sensing that a square was too static for the directionality of the site, and for programmatic constraints as well, Kahn divided the building in two parts. The significance of the plan division is that the two sides were ambiguously equal and unequal, simultaneously.



40. Upper floor plan of Kimbell shown on site. Exterior courts punctuate gallery in a random manner. Auditorium and temporary exhibition located in smaller top portion of building. Binuclear layout of two squares in plan linked by connector in the lane of trees is evident, 1967.

The second, 'H-Plan' scheme for the Kimbell Art Museum attempted to respond to the experiential qualities of this specific site. Rather than capture the central lane of trees within a building mass, Kahn allowed trees to pass through the building in this plan. The two halves of the building were joined by a thin connector, composed of vaults oriented as the building. In comparison to the first layout, this central arcade was narrower than the first, and the two side arcades were deleted. Unlike the first plan, the new link was located in the center of the building, which had shifted towards the north, closer to Camp Bowie Boulevard. Dividing the building in half, the building connector established a central hall that completely extended the axis of entry through the site from front to back. Thus the building was divided in a similar manner to the site, occupying and connecting both halves. The central connector was placed in the center of the two building masses, implying a symmetrical plan organization. However, Kahn layered both symmetry and asymmetry within the overall arrangement, and exploited the dual readings of the site. Retaining the initial square geometry, this new plan was balanced due to a possible reading of an approximation of a double square in plan formed with the aid of the entry plaza and pools. The combination of a large mass in area and height linked to a much smaller one also yielded an imbalance, complementing the balance of the plan. Ambiguity was actively employed to create the unique experience of a singular building in a park, and also to create the image of two buildings separated by trees, yet linked together. This plan ambiguity was further developed in the layout of the galleries, with numerous light courts punched into the building at various, seemingly random locations and sizes. The 'H-Plan' showed Louis Kahn attempting to integrate axial relationships, geometrical proportions, site-context relationships, and the experiential in his architecture. Although this arrangement went through numerous variations, the ideas at this stage of Kahn's design process remained the same, until budget constraints forced drastic changes in the next plan arrangement.¹⁶ It was also important to Kahn at this stage to keep all museum spaces covered by vaults, and equally important, all oriented the same. The significance of this resulted in a connector that was transparent in the north-south direction to allow visual contact with the trees. In concert with the overall vault layout, the connector was articulated with a series of vaulted roofs. Moreover, the single connector was covered with three vaults, when only one vault turned in the long direction would have certainly been sufficient and economical. The vaulted linkage therefore illustrated the site and building grain, or directionality, and also anticipated Kahn's desire to fit (force) all functions of this institution into one form unit. Regardless of proportion, the servant form is equal to those that it serves, which is in direct contradiction to Louis Kahn's well-known ideas about served and servant spaces. Here again Kahn chose to break the rules that he formulated, introducing ambiguous readings that contradict each other, yet create numerous variations on a theme. Moreover, the synthesis of building and site that Kahn sought was undermined by the obsessively strict geometry of his double-square building plan. Certainly there was an opportunity to relate the Kimbell Art Museum shape to the irregular shape of its site, yet not unlike Johnson's Amon Carter Museum, Kahn chose to contrast his building with the site. It is typical that the building is orthogonal, and he makes no response to the skewed orientation of Camp Bowie Boulevard, which some other architects would have found a way of exploiting.¹⁷ Kahn's search for pure Form often introduced a scizism with the circumstances of Design, and resulted in resolutions that encouraged ambiguous interpretations.

The “C – Plan” of 1968

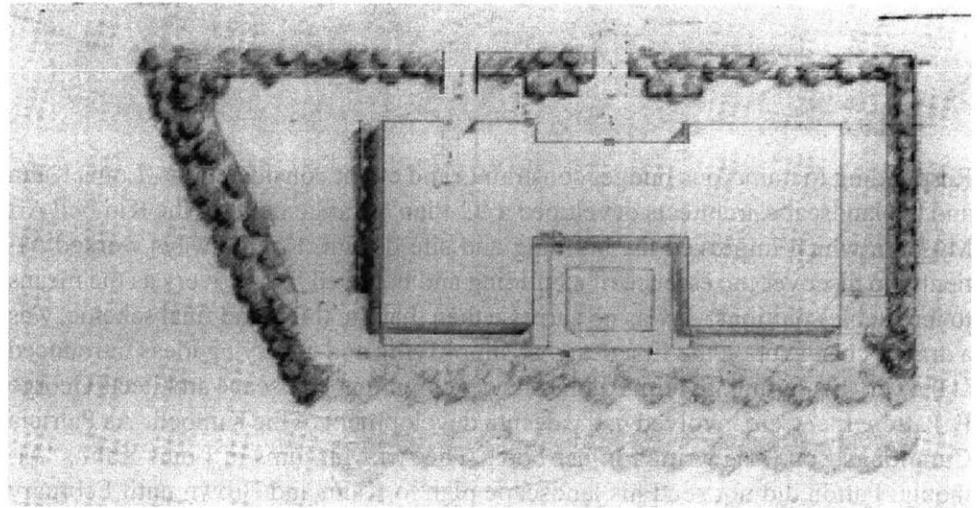


41. Model of third version for Kimbell Art Museum, 1968. Large square pool in the recessed entrance court is balanced by smaller pools and open porches on each side. The building is seven vaults wide, with lower-level parking compressed at rear, wrapping around the sides of museum in excavated areas hidden from view.

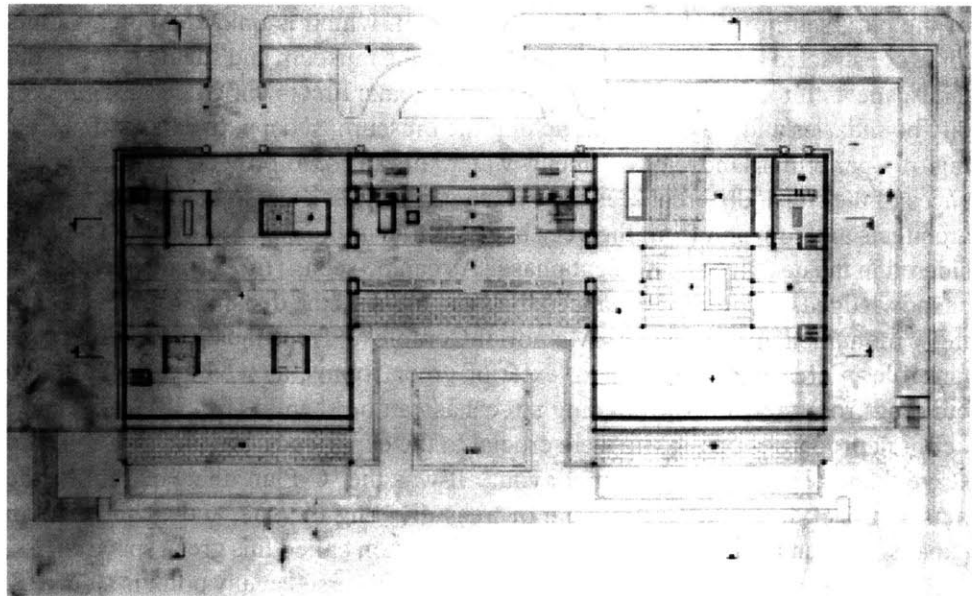
Responding to numerous budget constraints and client considerations, Louis Kahn and the landscape architects developed a ‘C-Plan’ arrangement for the Kimbell Art Museum which improved the building and site design. Kahn always worked patiently to discover the essence of a building and believed in discovery as the means to inevitable solutions. It was no surprise then that the third, and final scheme, was a drastic change upon the first designs- simplifying and clarifying ideas introduced at the very beginning. In terms of the site development, landscape architects George E. Patton, Inc. were involved in the design development of the Kimbell. As Patricia Cummings Loud has written in her book, *The Art Museums of Louis Kahn*, “Although Patton did not send his landscape plan to Kahn and Brown until February 1970, the concept seems to have been discussed with Kahn and established very early. Patton’s continuing involvement with revisions emphasizes the importance of the park setting for the Kimbell Art Museum, which is unique among Kahn’s three constructed museums.”¹⁸ As the layout of the museum and site developed, the landscape architects articulated three personal goals: first to enrich the amenities of city boundaries and ways of approaching the museum; second, to convey an offering of a particular landscape element- water, and third, to provide diverse experiences of the site at different seasons of the year.¹⁹ It was clear to both the landscape architects and to Kahn from the very beginning, that the entire site should be considered in the design development phase. As can be seen, (fig. 37), the new layout acknowledged, and indeed enhanced the vista towards the distant, and overwhelmingly monumental Will Rogers Memorial Complex. Trees thus played an important role in creating well-defined, exterior green rooms, as well as screening the building from view on surrounding streets as can be seen in (fig. 38). The space defining properties on the site were crucial to the experience of Kahn’s design, and strengthened by the new building layout. It was the ‘C-Plan’ that first pulled the museum back from the central lane of trees dividing the site, and established an expansive open lawn in front of the museum. Patton called this green space a park, and described it as, “An open lawn which can be traversed at any point is an invita-

tion to all ages providing freedom of movement, an expanse of sky and a domain which gives scale and dignity, without a trace of austerity, to the distant view of the museum.”²⁰ Patton wanted to provide multiple paths and choices that took advantage of the site characteristics, and this is similar to the freedom of movement found in Kahn’s building interior. Also of importance in his description, Patton emphasized a correlation between the distant view of the Kimbell Art Museum and entry sequence through the park. Unlike previous schemes, this new design established a large green lawn scaled for the entire Amon Carter Park area, and almost totally screened Kahn’s museum from view except from Arch Adams Street. As a consequence of the smaller building layout of the ‘C-Plan’, the center rows of trees distinctly severed the site in half with one side completely covered by the museum, and the other completely open and untouched by any construction. Thus the park became a counterpoint to the building itself that established a palpable void in front of the Kimbell, and simultaneously created a forecourt to enhance entry into the museum (fig. 41).

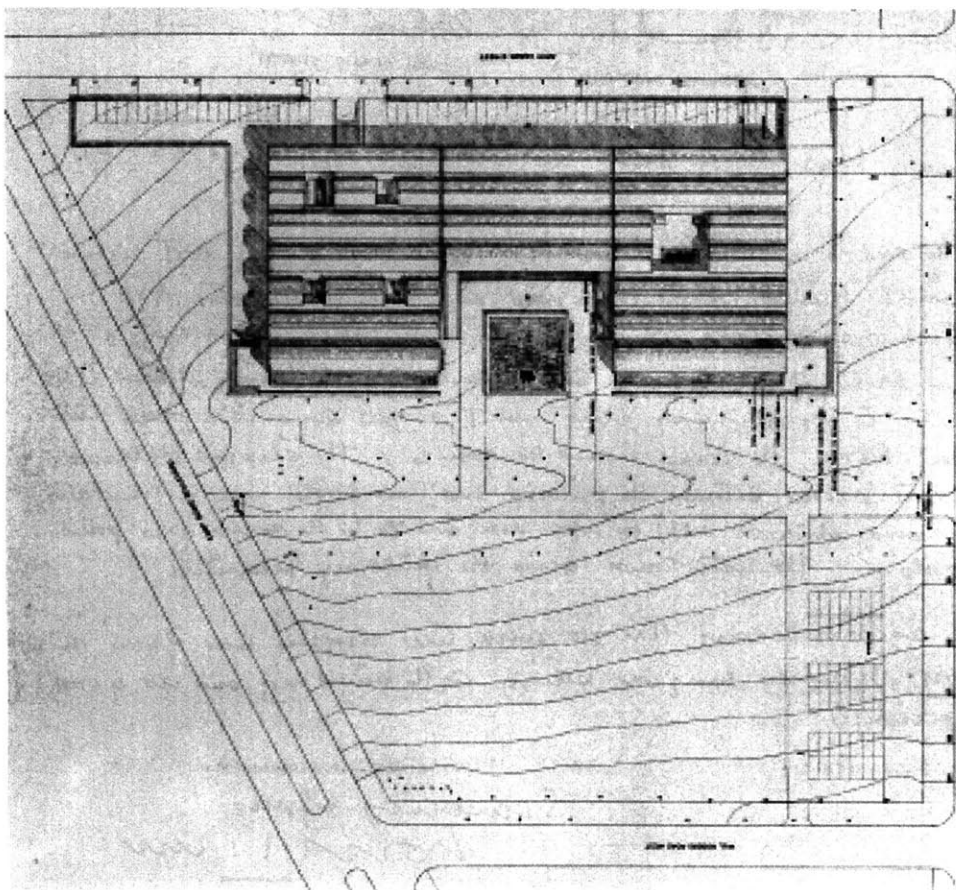
42. Site plan sketch by Louis Kahn, fall, 1968. Kimbell Art Museum completely surrounded by trees with parking fitted into residual spaces on three sides of the building. Front entrance is on axis with rear entry, and perpendicular to Arch Adams street and the existing alley of trees.



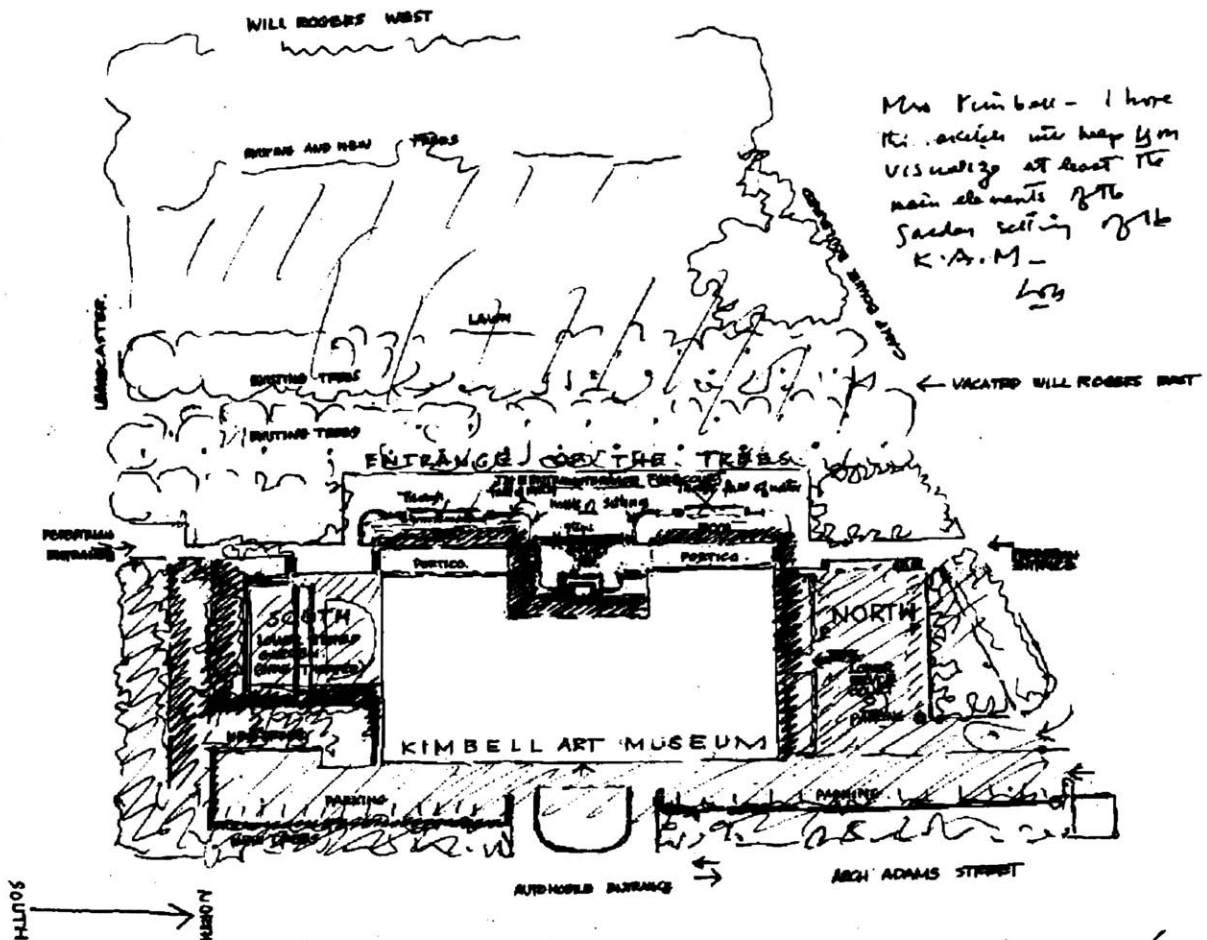
43. Floor plan of ‘C-Plan’ arrangement, 1968. Two wings of museum connected by one vault oriented the same as all others. The labyrinthine experience of the interior retained with varied, exterior courtyards placed within the building mass that would not be legible on the exterior.



On the opposite side of the Kimbell facing Arch Adams Street, Kahn exposed one of the most shockingly ambiguous elevations of his career. With trees hiding the building on three sides and a mute building elevation on its exposed side, Louis Kahn designed the Kimbell Art Museum to be obscure in some ways, yet decipherable and clear in others. A very large automobile drop-off drive was also introduced under the central portion of the building for the first time with the 'C-Plan.' The vehicular entrance necessitated an entrance and lobby space on the lower level, and extensive site excavation. Open porticos and the porosity that they provided on that side of the building were deleted in favor of a flat building wall directly adjacent to paved parking areas. Thus a sense of compression was achieved on the vehicular access side on the east, and expansion on the pedestrian, western side of the building, which reinforced a graining, or directionality to the site and museum. Likewise, the building seemed to be stretched north-south in the long direction of the vaults, and compressed perpendicular to the vaults down the slope of the site. With this simple manipulation of form and space, Kahn charged the classically symmetrical layout for the Kimbell with dynamic tension directly related to the site. Ultimately, the existing passageway of trees in the center of the site greatly impacted the formal layout and experience of the Kimbell Art Museum (fig. 42).



44. Site Plan drafted at 1:1200 scale, fall 1968. Open lawn shown for the first time on opposite side of center passage of trees. New trees and walkway indicated adjacent and parallel to existing alley of trees. Front porticos were not a part of the site circulation, and a separate drive connecting Camp Bowie Boulevard with Lancaster Avenue was added. Lower level entrance not shown as a prominent feature in this design. Sculpture placed on axis with center of building in large reflecting pool not on axis with exterior porticos. Some parking shown at edge of open lawn.



Dear Mrs Kimball: Wednesday June 25 '69

The entrance of the trees is the entrance by foot which links Camp Bowie Boulevard and West Lancaster Ave. Two open porticos flank the entrance court of Terrace. In front of each portico is a reflecting pool which drops its water in a continuous sheet about 70 feet long in a basin two feet below. The sound would be gentle. The sloped entrance court passes between the porticos and their pools with a fountain, around which one sits, on axes designed to be the source of the portico pools. The west lawn gives the building perspective.

I am confident that the work in progress now from now on. I believe every one believes in the building and its good purposes.

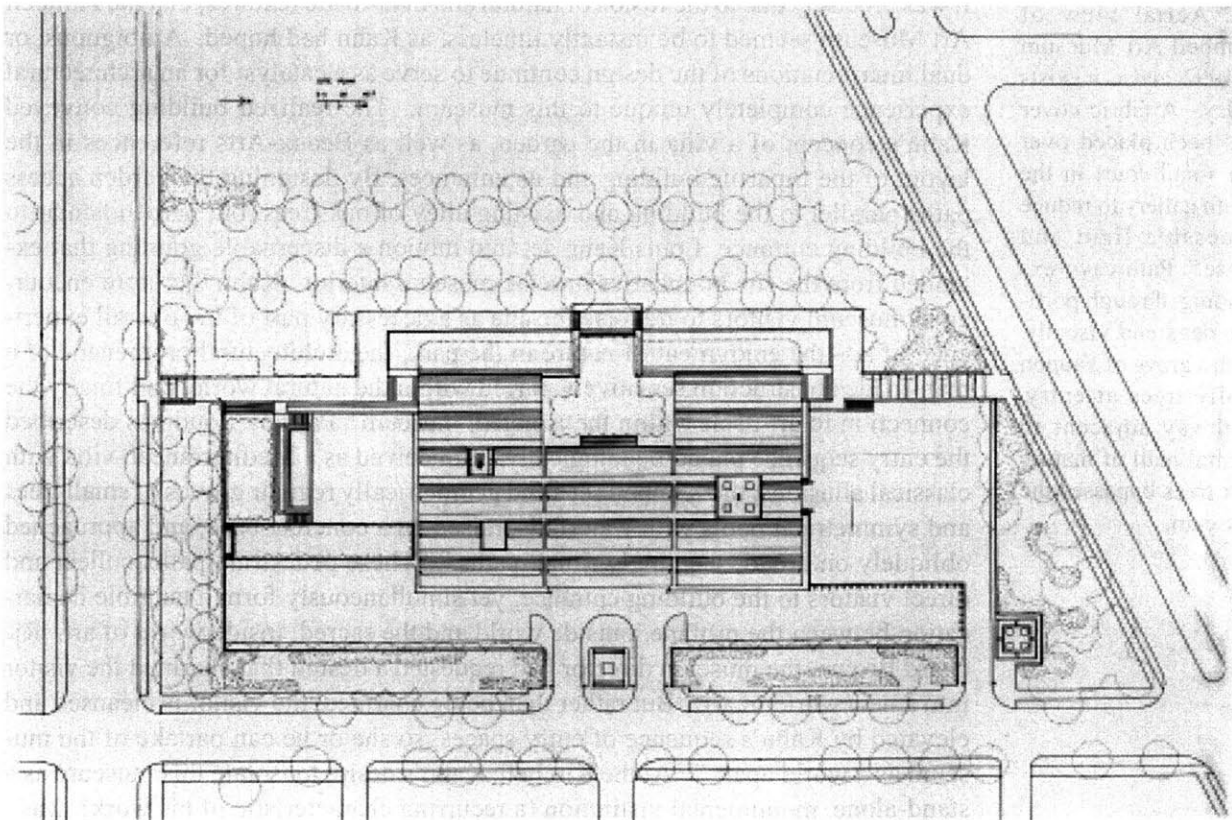
Sincerely yours
Louis Kahn

45. Sketch of site plan and letter to Mrs. Kimball by Louis Kahn, June 25, 1969. Sketch shows lawn and 'Entrance of the Trees' in front of museum. In this excerpt of his letter to Mrs. Kimball dated June 25, 1969, Kahn describes the existing, 'Entrance Of The Trees.'

Final Site Design of 1969

A variation of his earlier 'C-Plan' scheme, Kahn's final design of the Kimbell Art Museum achieved admirable integration of building and landscape. The realized design retained the dual reading of one large, compact form with subtracted openings, and also two wings joined by a central connector. The interpretation of the building as a single form was reinforced with an overall, monolithic attitude towards material palette and color. Louis Kahn correctly predicted that the stone and concrete that he selected would yield a complimentary, subtle play of color and texture variation. However the effect of two wings linked in the center remained in the plan of both the lower and upper floors. On the lower level, the entrance lobby immediately behind entrance doors and recessed drop-off area is only one structural bay wide. On the upper floor, the two gallery wings were connected by the one-bay-wide entrance lobby, in a similar fashion to earlier schemes. The final site design also developed the sense of graining that was present on the site before Kahn began designing. Vaults oriented parallel to the site slope and rows of trees either extend vistas or block views to surrounding buildings and streets. Within the museum Louis Kahn subtracted courtyards from the building form to collect natural light, provide spatial variety, and integrate nature into the experience of the museum. However on the exterior, landscape design created a jewel-like effect with the Kimbell hidden behind trees (fig. 45). The final design draws its strength then from the investigations of earlier designs, and consequently achieves a synthesis between architecture and landscape unique in Kahn's oeuvre. Perhaps only at the Salk Institute, with the aid of Luis Barragan, did Kahn realize such a sensual and ontological architectural masterpiece.

46. Site Plan, final realized version illustrating vegetative walls all around the Kimbell Art Museum. This plan also clearly shows that the lower level entrance is on axis with Darnell Street. Placement for a large exterior sculpture shown centered with, and also screening the building. Amount of parking located on site has been reduced in favor of vegetation, and consequently, increased pedestrian movement from remote parking along surrounding streets.





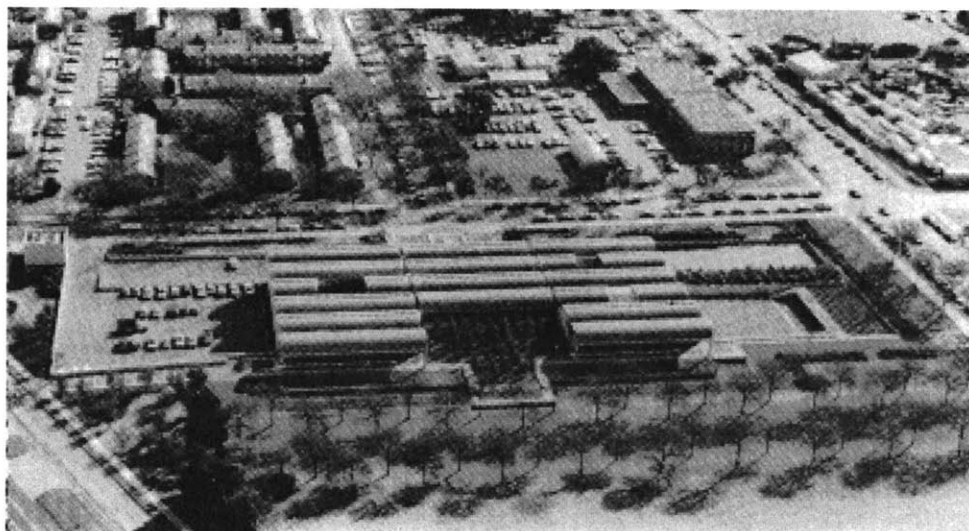
47. Aerial view of Kimbell Art Museum in 1992, and as it exists today. A fabric cover has been placed over the small court in the south gallery to reduce excessive light and glare. Pathways extending through porticos dead end visually, with a grove of Yaupon Holly trees at entry. Pathway adjacent to central mall of mature oak trees bypasses the museum.

It was precisely due to the fusion of natural and man-made features, that the Kimbell Art Museum seemed to be instantly timeless, as Kahn had hoped. Ambiguous, or dual interpretations of the design continue to serve as a catalyst for an architectural experience completely unique to this museum. The realized building conveyed Kahn's concept of a villa in the garden, as well as Beaux-Arts references in the layout of the tripartite building and its entrances. By designing the garden access paths parallel to the building and existing alley of oak trees, but perpendicular to the building entrance, Louis Kahn set into motion a discernable graining that extended from the site boundaries into the museum interior. Kahn therefore encouraged museum visitors to traverse the site as a necessary part of the overall experience of art- the enjoyment of nature in the park, the architectural promenade of a man-made construction sensitively placed within the natural world, and finally the connection to art itself within the isolated, museum. Patricia Loud has described the entry sequence phenomenologically, "Conceived as a Mediterranean villa with classical allusions, the Kimbell set amid geometrically regular groves of small trees and symmetrical pools with waterfalls, raised on a concrete base, and approached obliquely on broad, seemingly ritual, paths."²¹ These pedestrian paths collect and direct visitors to the building entrance, yet simultaneously form a tangible demarcation between the profane, outside world and the sacred, inside world of art. Richard Brown, the museum director had requested a design that charmed the visitor into a new world of art, "But rather than being charmed, the visitor is cleansed and elevated by Kahn's sequence of entry spaces, so she or he can partake of the museum as a world apart."²² At the Kimbell, Kahn's desire to isolate this museum as a stand-alone, monumental institution (a recurring characteristic of his work), was



balanced with a sense of place derived from the site. The final arrangement of all components of the design thus supported each other to create site specificity created out of repetitive design features such as two pools, two groves of trees, two exterior courts within the public galleries, and two building entrances (fig.47). Movement on the site in the realized design offers various degrees of intimacy with the building, depending upon proximity. The existing colonnade of mature, oak trees in the center of the site was claimed by the Kimbell as an amenity, and established an analog to the movement inside the museum. Adjacent to this entrance of the trees, Kahn placed a pathway paved with crushed granite set in concrete that jogs away from the entrance, and bypasses the entrance. The closest path to the entrance utilizes the porticos as thresholds for what Kahn called a world within a world, cloistered away from the outside. The museum thus needed to be obscured, and consequently discovered from all sides, in the round, like sculpture. It is the automobile entrance that abruptly terminates with the lower-level entrance, and can only be appreciated from afar, on Darnell Street. Although only a few plans and photographs show the relationship between the Kimbell and its environs, the importance of that existing street to the experience of Kahn's design is significant.

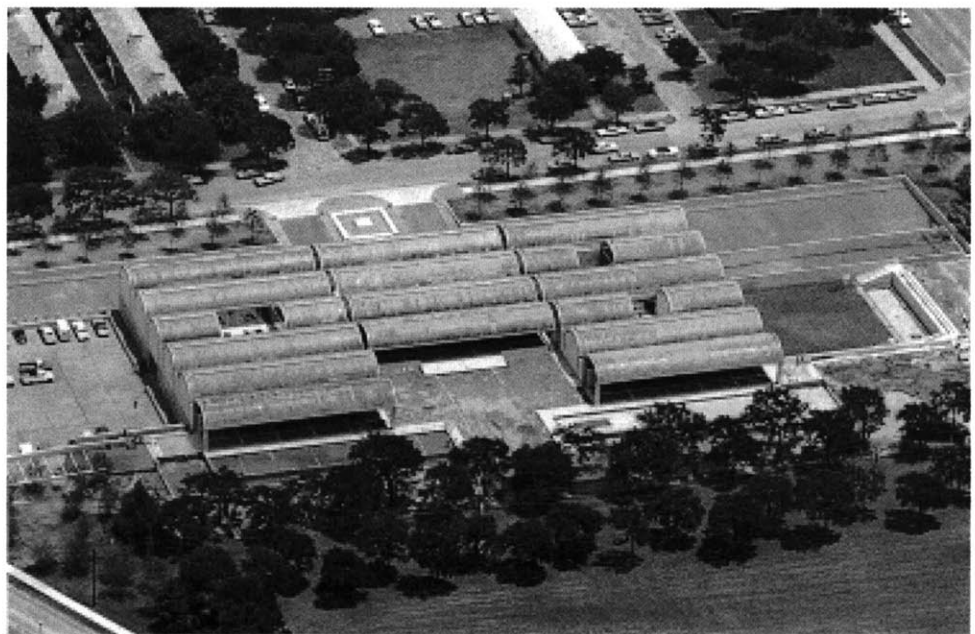
48. Aerial view from northwest, showing relationship of Amon Carter Museum, the Will Rogers Memorial Center, and open lawn in front of Kimbell Art Museum, 1970. Organizing the park's composition, the lawn on the Kimbell site is on axis with Memorial Tower and provides necessary open space to maintain views. The roof of the Kimbell is its fifth facade, visible from the hill above and the tower observatory.

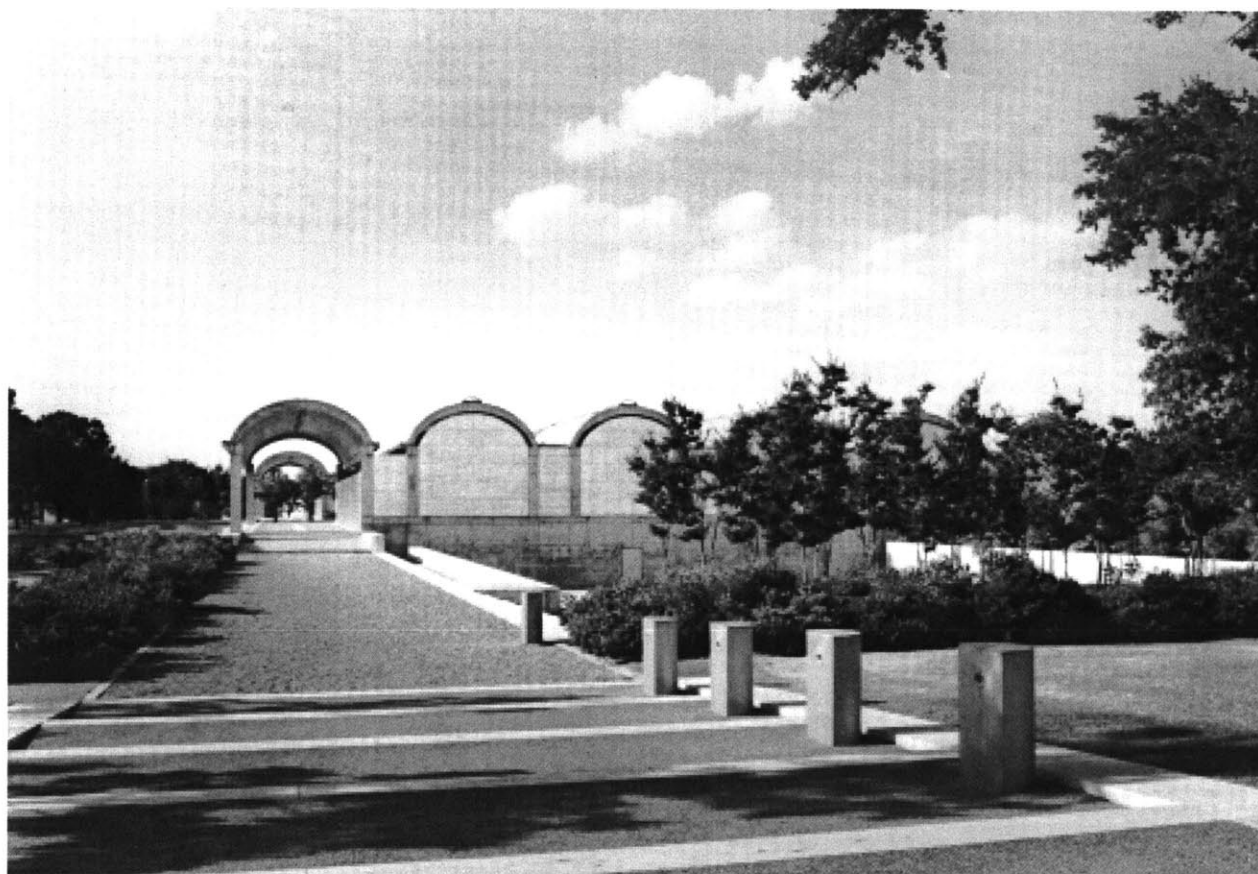


49. Aerial view of site. Darnell Street provided a long, axial approach appropriate for the Kimbell Museum's lower-level entrance. The Beaux-Arts symmetrical arrangement of open, side courts on a cross axis to the entrances is legible. The Kimbell utilizes its suburban context.

Movement by foot on the site thus became the key to experiencing and understanding the design, and illustrated Kahn's belief that some institutions could be appreciated from a distance. Kahn described this idea in a 1971 essay entitled, *On Winking at Chapels* (included on next page). With his insights about the experience of architecture, art and nature, Louis Kahn expressed in a most sublime manner his polemical beliefs about how the experience of architecture. From initial site concepts to the realized building, Louis Kahn attempted to express mystery and wonder for this special museum site. Kahn's genius with the Kimbell design began with his response to nature, and in this way Kahn was a most humane architect, offering his architecture to all of mankind, for all time, in harmony with nature. "Louis I. Kahn's Kimbell Art Museum in Fort Worth is not a building that imposes its will on nature, but lives in praise of it, Nature in all of its senses."²³ His openness to discovery within the design process enabled Kahn to realize, (as with the Salk Institute), one of his most successful marriages between the natural and the man-made through ambiguity. The Kimbell Art Museum realized the full potential of its site, and thus emerged as an offering of architecture- timelessness achieved through the inseparable integration of man and nature. Yet, a sense of play and leisure was not forgotten in the overall experience of the museum, "It is on the lawn before the west entry that everyday life survives: bicyclists stop for a rest, families picnic, kids play in the grass, lovers neck, dogs chase frisbees, and teenagers wait for something to happen."²⁴ The realized design not only retained the geometrical purity, and sensitive balance between built form and the natural environment of the initial scheme, but also yielded more open space on the site for the enjoyment of visitors. In the end, the Kimbell Art Museum fulfilled its mission by becoming a fine art object itself, isolated behind a screen-like container of trees (see appendix 2, III, A).

50. Aerial view of Kimbell as site work neared completion in June 1972. Vaults are perpendicular to axis of entry yet parallel to the direction, or grain of oak trees. Center grove of holly trees not yet planted at park entrance between the two gallery wings.





On Winking at Chapels

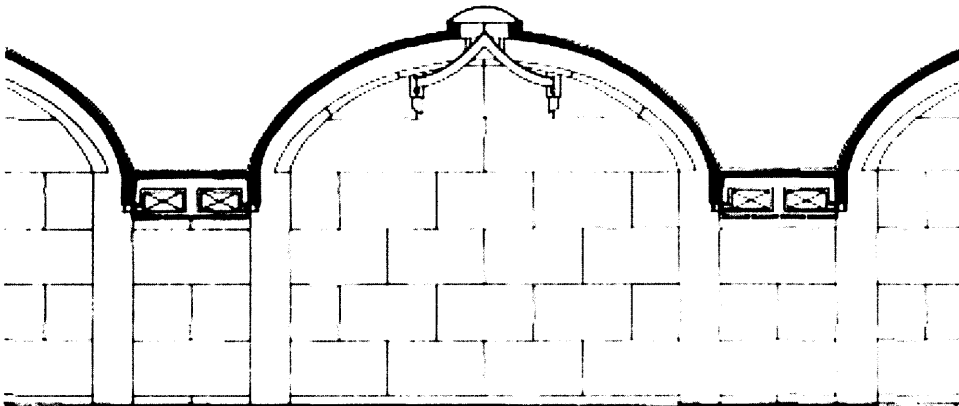
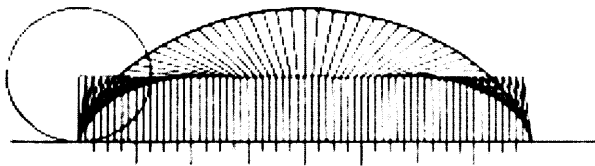
As a problem in architecture, consider a chapel of a university. Is it a space divided for denominations of set ritual or is it a single space for inspired ritual? In search of form for such a chapel, its concept may come from how you think about its undefined nature. To invent a circumstance, let us imagine the feelings of a student of architecture after an inspiring criticism. Full of dedication to his art, he passes the chapel and winks at it; he doesn't go in, he winks at it. This is inspired ritual. The chapel has a central space which for the moment we won't describe; around it is an ambulatory for those who don't want to enter. Outside the ambulatory is an arcade for those not in the ambulatory; the arcade overlooks a garden for those not in the arcade. The garden has a wall for those who don't enter and merely wink at the chapel.

51. Pedestrian path from Lancaster Ave. to the southern portico which mediates between the museum to the right, and the park to the left.

Experiencing The Kimbell Art Museum

PART THREE

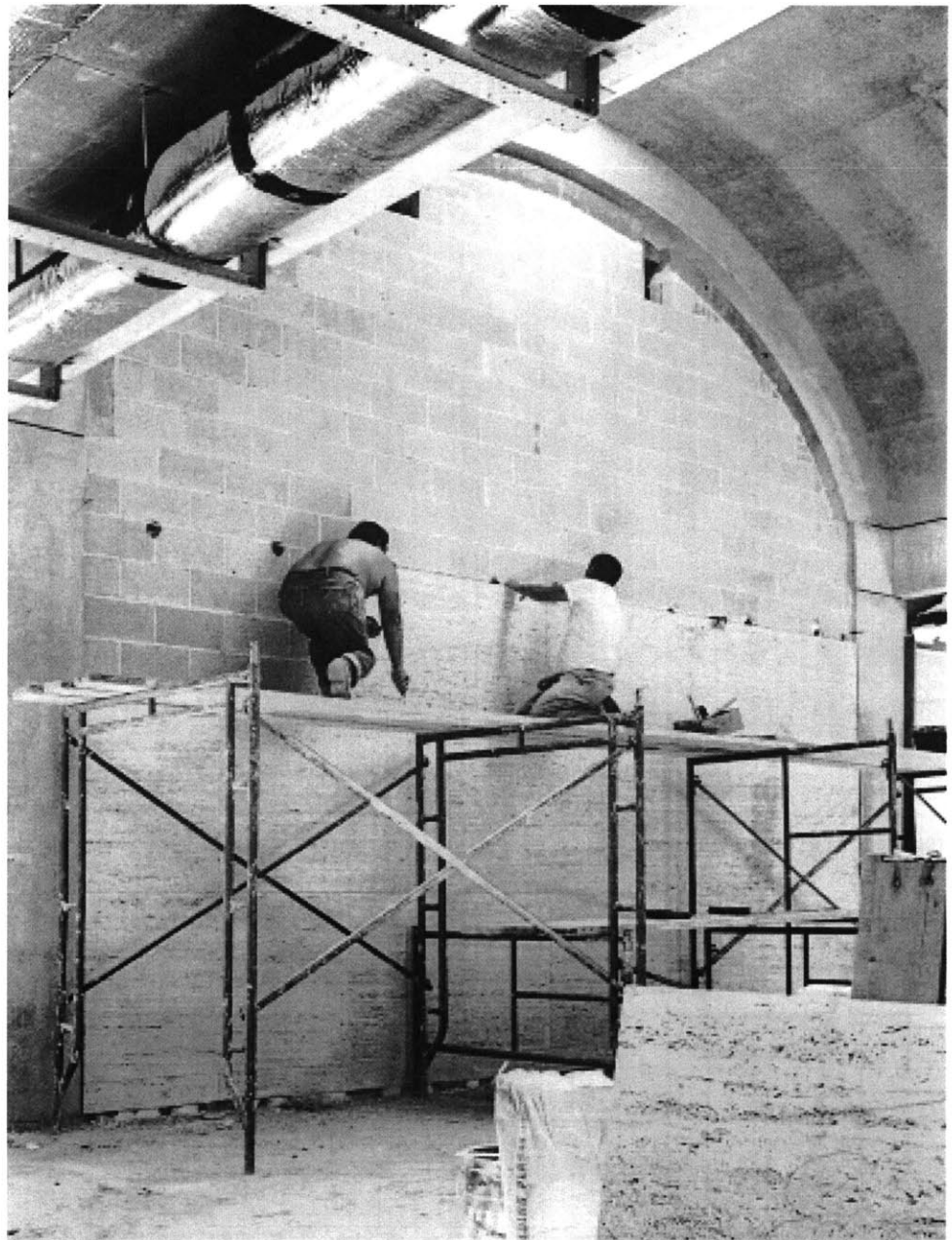
The Building Design

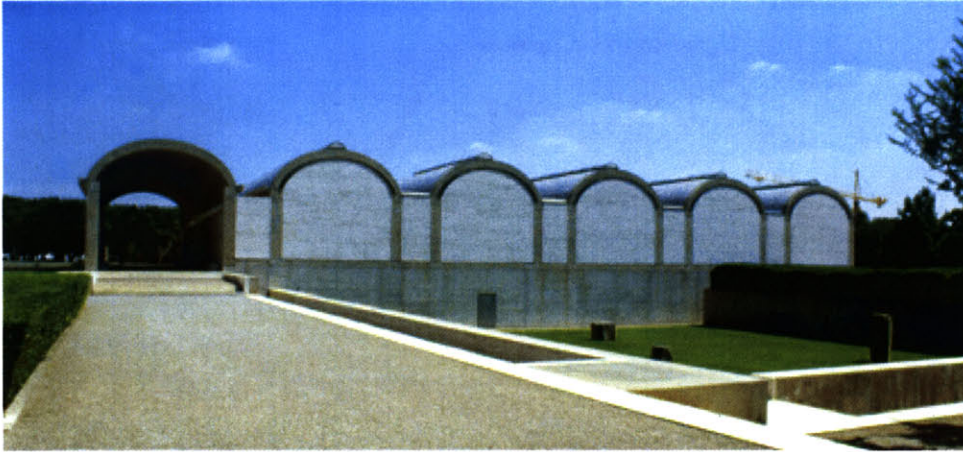


It is the spirit of architecture which says that architecture does not exist at all...that's what the spirit says. It knows no style, no method. It is ready for anything. And so the man must develop the humility of offering something, an offering to architecture. An architect is part of the treasury of architecture in which the Parthenon belongs, the Pantheon belongs, in which the great lyceums during the Renaissance belong. All these things belong to architecture and make it richer; they are offerings, you see.

When you have all the answers about a building before you start building it, your answers are not true. The building gives you answers as it grows and becomes itself.

52. The Kimbell Art Museum, September 1971. Installation of travertine panels onto non-bearing wall hid the true construction of infill walls. Some materials and equipment were necessarily kept from view, such as ducts and concrete block walls, in spite of the architect's wish to expose the Kimbell's construction. The vaults were cast with the end arches and free-standing columns, and therefore do not rely upon the infill walls for support. Travertine is a brittle stone, and the large panel size used here indicates its non-structural role here. The building reveals itself for discerning eyes.





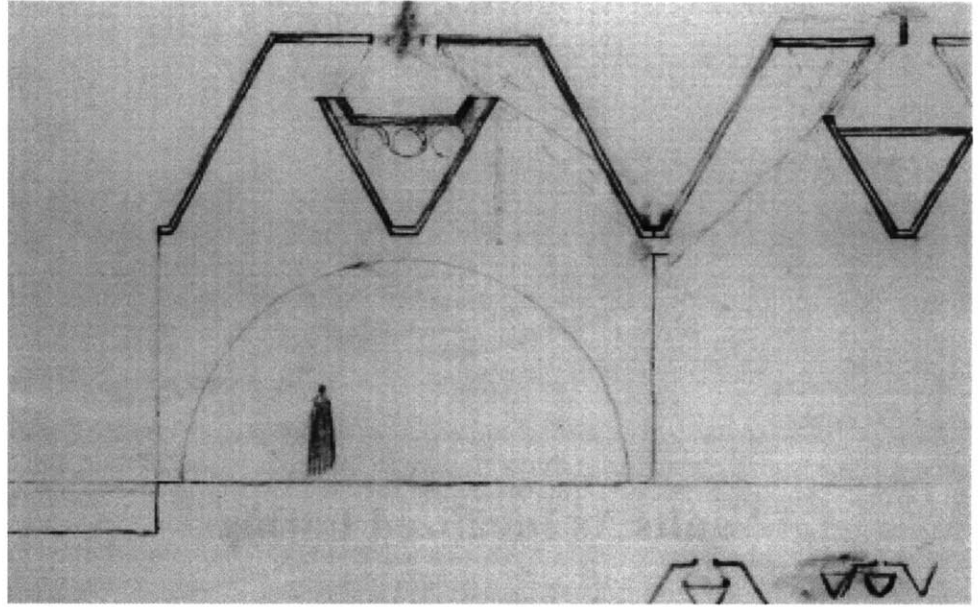
Vaults As Idealized Forms

Essential to the experience of the Kimbell Art Museum, the vaults expressed a primitive, archetypal reference to the beginning of architecture, and simultaneously exhibited the sophisticated heroics of modern engineering. Collapsing past and present into a synthetic hybrid, the vault forms successfully achieved a rare quality of timelessness, so important to Louis Kahn. The vaults also served as the DNA of the building; it was a guide for how everything else would relate to its signature. Indeed, the vaults recalled a familiar association, a remembrance, a feeling that made the museum immediately endearing to both visitors and staff alike. The Kimbell vaults have become the image of this design specifically, and exemplary of Louis Kahn's design philosophy about the measurable and the unmeasurable in general (fig. 53). Although a favorite among laymen and professionals alike as an architectural sign, vaults have been misunderstood structurally by both. And Kahn took full advantage of this phenomenon at the Kimbell Art Museum.

The reverence for vaulted forms in general relied more upon image recognition and associations, or rather delight, than on structural commodity. The public's adoration of Kahn's vaults exposed warm sentiments associated with this form-image, and revealed an innocent trust in things that *look structural*. Now of course this blind trust in architects and their buildings has always been quite common, as the public at large never fully understood how buildings stood up any way. And Kahn knew that the public did not need, or even care to know the minute details of the Kimbell structure as long as the expectations of stability and economy appeared to have been met. In spite of their structural ambiguity, the Kimbell vaults have been much admired, and Kahn correctly recognized that the lasting impression of his design was its spirit, not obvious structural economy. Ambiguous interpretations aside, the vaults made the Kimbell design successful: mysterious, seemingly rational and yet puzzling, both modern and flexible, ancient and rigid. By exploiting the multiple readings inherent within the vault-like forms to full advantage, Louis Kahn expertly showcased all of its potential beauty through subtle, albeit sometimes confusing, variations. Generated in concert with the site design, the Kimbell vaults played a central role in Kahn's design, and as a consequence, the vaults remain an appropriate beginning for any analysis of this architectural masterpiece.

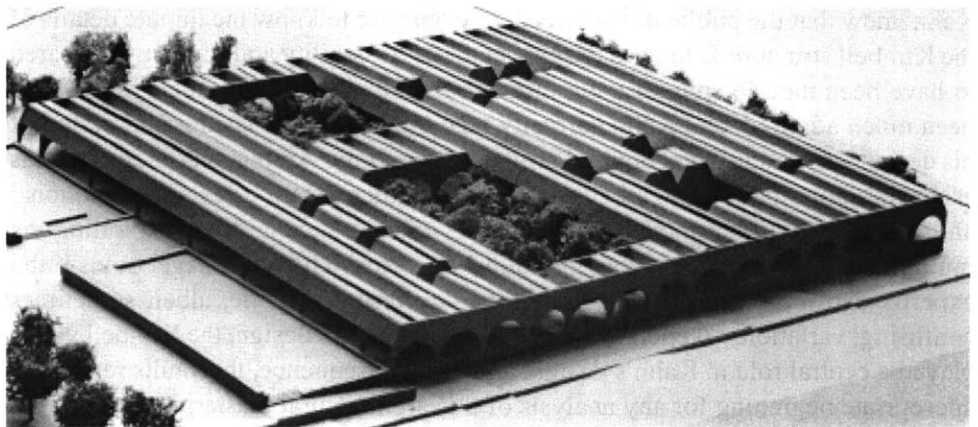
53. Southern facade of Kimbell Art Museum. Kahn's design principle built architecture up by using a functional, spatial, geometrical, and structural unit. Associations with storage buildings in the surrounding Fort Worth area have been attempted by critics, but Kahn never articulated this design viewpoint, as it would have been purely circumstantial and coincidental. Note that the location of skylights at their apex, the slender columnar supports, and the use of concrete reveal that these forms are not true vaults.

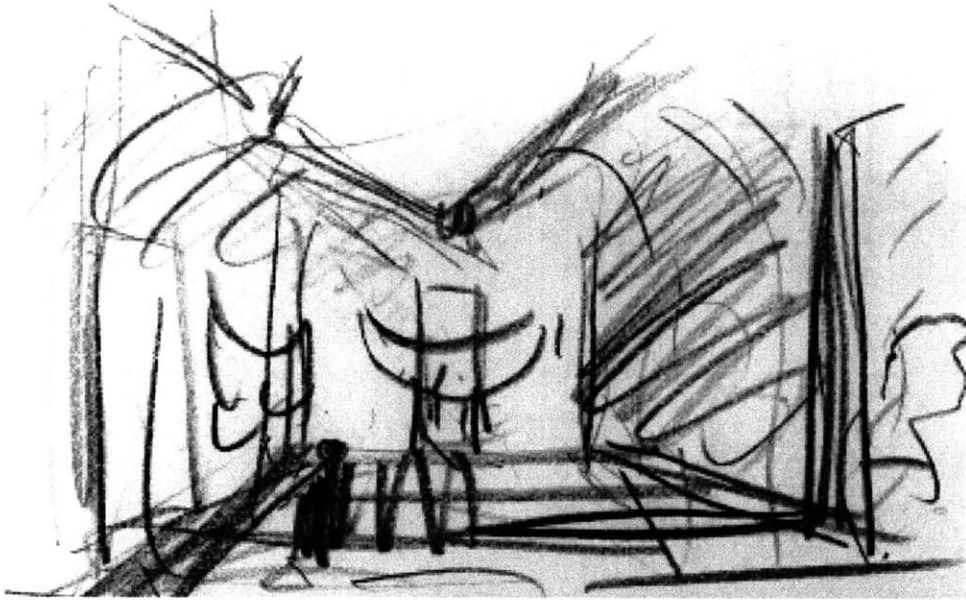
54. Sketch by Louis Kahn for folded-plate roof, March, 1967. The roof structure is supported by end walls with columns in between. Circular opening seems to be at odds with overall structural logic and form. Vault on the left is cut through exterior arcade at the museum's front main entrance, with the reflecting pool shown. The line of glass between the exterior and interior enclosure is almost nonexistent.



55. Second model by Kahn's office, Spring, 1967. A folded-plate structure supported by end walls and columns was a signature feature. It appears that the roof composition was independent of functions beneath, and the preferred direction of travel within was perpendicular to the vaults. Although the largest portion of the building was exactly half of a square in plan, Kahn made no other references to the corners or center. An asymmetrically placed connector in the square transformed the alley of trees into a formalized part of the museum experience. The permanent galleries were all located to the left of the trees, and the main entrance, reflecting pools, changing exhibitions, auditorium and book-store on the right.

Although the amount of documentation on the Kimbell Art Museum vaults has been extensive, few authors have correctly conveyed their true nature. First of all, the forms commonly mis-labeled as *vaults*, do not, and never appeared to be actual vaults based upon Kahn's sketches. As can be seen in Louis Kahn's first sectional sketch (fig. 54), the initial shape of the roof units were not barrel vaults, but rather a folded-plate structure. This folded-plate design clearly illustrated that structural integrity and rigidity was gained through geometry of shape, not mass. Furthermore, each half was independently supported by transverse walls, not columns, that divided interior space and resisted lateral forces. Containing huge semicircular cut-outs large enough to produce an open expanse of space, the arrangement of walls in relation to the direction of the roof/ceiling structure created a strong rhythm perpendicular to the roof units (fig. 55). The roof units encouraged movement perpendicular to their span, expressing their true nature as beams. Perhaps the circular openings were intended to reinforce movement axially underneath the vaults, and thereby establish opposing directionalities. In this way Kahn surprisingly inflected a grain/countergrain directionality to a static square form that would not have been apparent from the exterior. Kahn's first design thus created significant tension between a square, exterior shape and its interior spatial experience.

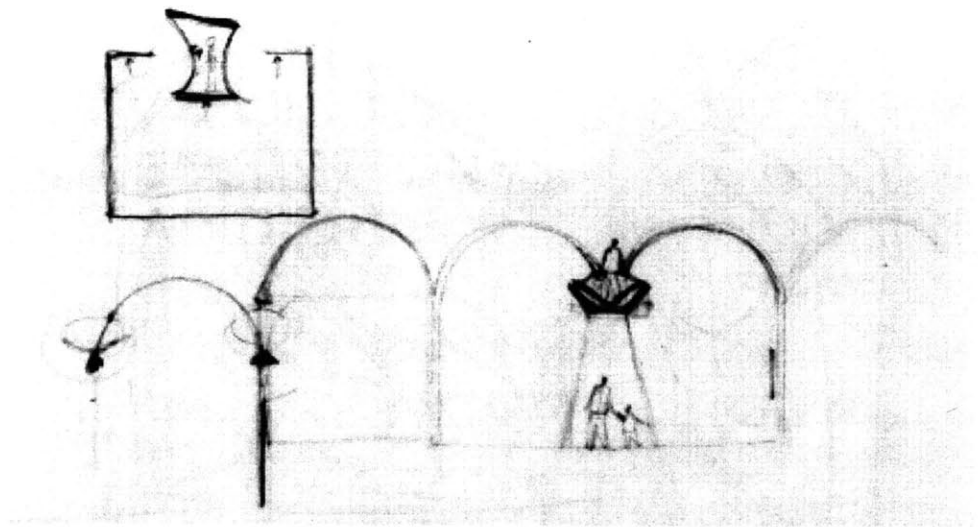




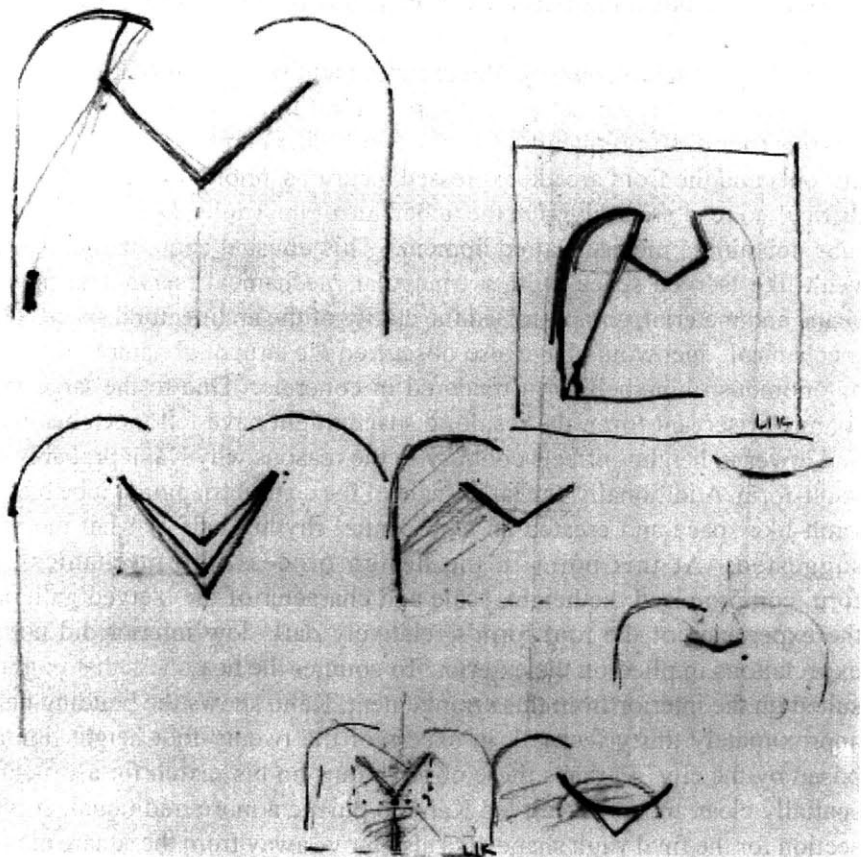
56. Perspective sketch of a gallery interior, March, 1967. Kahn indicates very generous gallery proportions- a room with very tall openings for doors and windows. Hovering from the gallery ceiling, a central reflector is shown sending light down to wash walls with diffuse illumination. Some light is shown filtering down through reflector in the center. A view of the exterior vegetation is indicated on the right of sketch through an opening in the wall.

A strong 'graining' was established with this scheme- as barrel vaults are normally entered on their narrow ends rather than from the side, as shown here on the left of the model. Moreover, the utilization of the roof units as beams may also explain why Kahn closed their ends with walls, as if to illustrate their spanning function and normative usage in providing an opening while supporting weight from above. Although concrete can be cast into any shape, the clarity of Louis Kahn's structural and representational logic seemed to break down with the semicircular openings in the cast-concrete, exterior arcade. Although placed adjacent to the reflecting pool at the main museum entrance, the exterior vault on the left of his sketch indicates that it received the same type of form, natural light and mechanical treatment as interior rooms. Consequently, the museum's side elevation with its large circular cut-outs and the front arcade expressed a curious ambiguity that would have been difficult to read precisely. On the underside of the vaults, Kahn shows a triangular tube containing mechanical equipment. This unusual combination of an angular vault-like 'served space' with a triangular mechanical 'servant form' of similar shape and material, compromised the clarity of the architectural space. The central mechanical duct would have also obscured the structural nature of the roof as an autonomous, thin-shell form rendered in concrete. Due to the large size of the triangular servant form, the resulting space might have felt much heavier, darker, and lower in height- effects contrary to the reasons why Kahn probably chose the vault-form. Additionally, the large scale of the central triangular tube bisected each vault-like space and created an experiential rhythm half of what the roof forms suggested. At this point in the design process, the mechanical, 'servant form' compromised the height, scale and character of the 'served' galleries. Thus the experience of the roof form's relatively dark, low interior did not meet the expectations implied on the exterior. To counter the heaviness that might have resulted on the interior from this arrangement, Kahn shows the building height to be approximately thirty feet tall, in excess of the twenty-foot height limitation imposed by the city. Perhaps these observations on his search for a structurally and spatially clear, modern vault led Kahn to pursue a more traditional, curved-cross-section for the final vault shape, and also move away from the square plan (fig. 56).

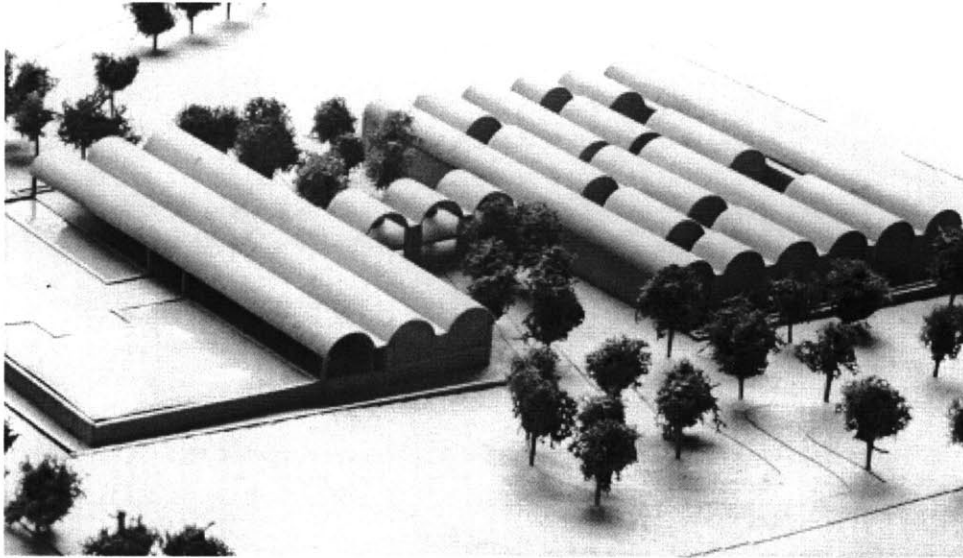
57. Schematic studies by Kahn, Spring 1967. Natural light is concentrated between two adjacent vaults with electric light directed out from the same, large apparatus. Note the large size of the light reflector in relation to human scale and the space it serves.



My mind is full of Roman greatness and the vault so etched in my mind that, though I cannot employ it, it's there always ready. And the vault seems to be the best. And I realize that the light must come from a high point where the light is best in zenith. The vault, rising not high, not in an august manner, but somehow appropriate to the size of the individual. And its feeling of being home and safe came to mind.



58. Various schematic sketches by Kahn, March 1967. A light reflector is centered under each roof-unit to block and redirect sunlight.

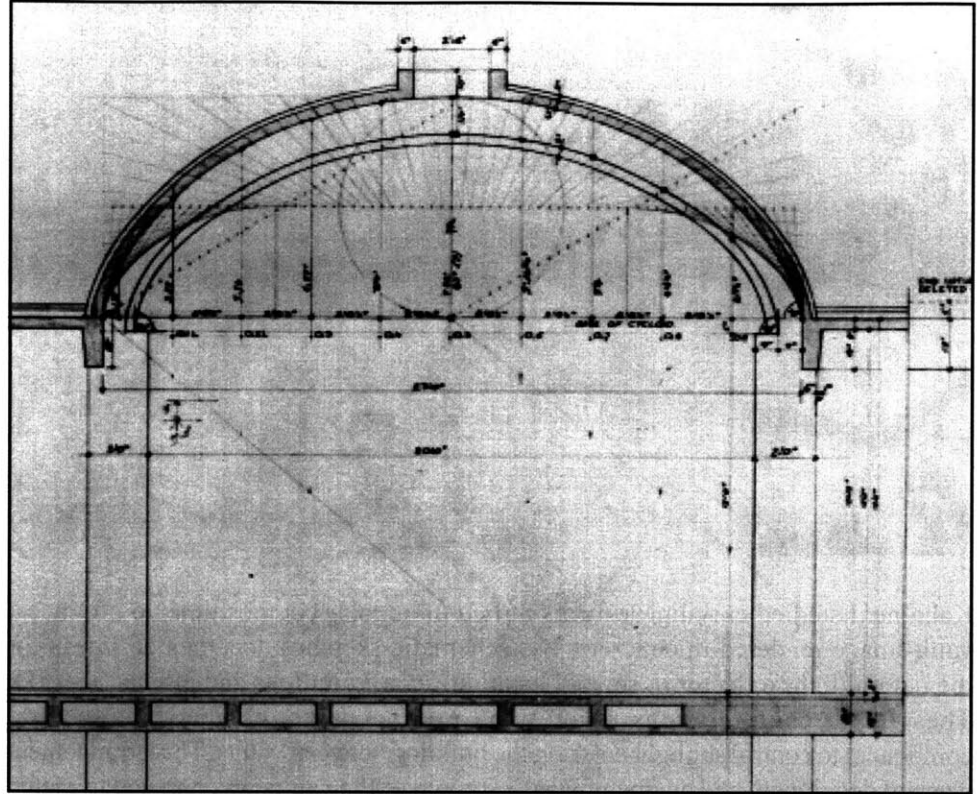


59. Cardboard model of 'H-Plan' scheme, fall, 1967. Central connector frames views in both directions, and expresses strong directionalities in the building layout. The roof forms are used as both barrel vaults- creating spaces parallel to their long sides, and as beams- creating perpendicular, cross-axial openings framed by the roof and supporting columns. The legibility of structure and direction would remain throughout the design process.

Kahn next studied curvilinear forms in lieu of angular compositions to produce a vault-image rendered in concrete. His schematic sketches documented ideas for the natural light reflector in several locations, configurations and effects (fig. 57). These early configurations relied upon a rather large, cumbersome, central component to control sunlight entering the building between vaults. This arrangement was not developed, and an opening at the crown of the vaults was pursued to match initial assumptions (fig. 58). Then Kahn returned to a lighting solution with an opening for natural light at the vault's crown, centered above the room. However, like the first scheme, these forms appeared to contain one contiguous space from the exterior, yet suggested two spaces from within. It was not until Kahn began to design his 'H-Plan' several months later, that the unusual vault-like, thin-shell/curved-beam form emerged. This new plan arrangement not only relaxed the geometry of the square plan, but also attempted to express the roof unit as both a beam and barrel vault. The 'H-Plan' encouraged movement on axis underneath each roof unit like a barrel vault, and simultaneously forced movement across, perpendicular to each roof form (fig. 59). It was here that Louis Kahn illustrated his search for a grain/countergrain effect in respect to the roof/room building unit.

The 'H-Plan' building arrangement marked the point in the design development phase when the structural engineer, Dr. August Komendant, was hired as a consultant.²⁵ The first curve Kahn studied for the roof units was a semicircle, but that proved too tall for the height restriction (fig. 61). Later, a flattened cycloidal curve was adopted by Kahn working with his project architect, Marshall Meyers (see fig. 1a).²⁶ As it was his engineer's responsibility to analyze the true nature of the vaults, Kahn focused upon the architectural expression and experiential qualities derived from this structural and spatial form.²⁷ As Komendant explained to Kahn, the cycloids were basically curved beams when separated by a slit at the apex for galleries, and thin-shell forms when completely solid for the porches. When solid for the exterior porches, the concrete shells gained their strength and rigidity through geometry and proportion; when separated by a skylight, as in the galleries, auditorium, lobby and library reading room, the structure acted like a beam, curved in section.²⁸ Additionally, pre-stressed steel cables embedded within the concrete

60. Kimbell vault section, 1970. The vault takes the shape of a cycloid curve, but the end arch is an ellipse, as designed by the structural engineer. At first Kahn wanted to maintain a uniform width for the glass strip, but later changed it to honor the engineering, and simplify construction.



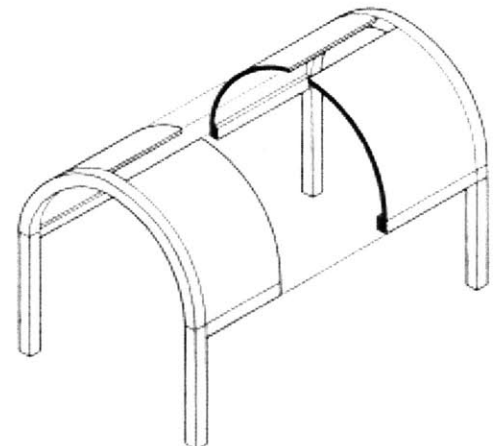
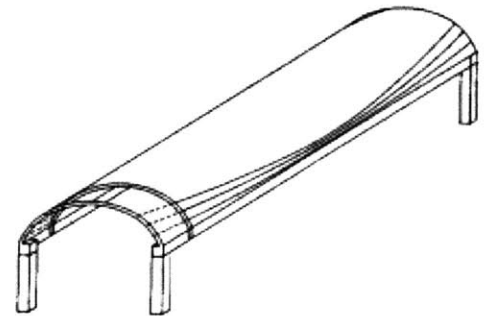
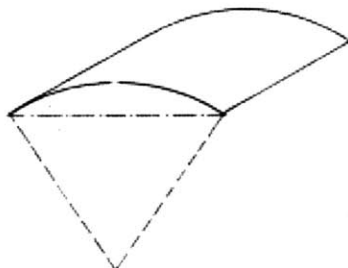
61. Diagram comparing typical vaults. The span of all vaults is held constant, but the height varies with each type.

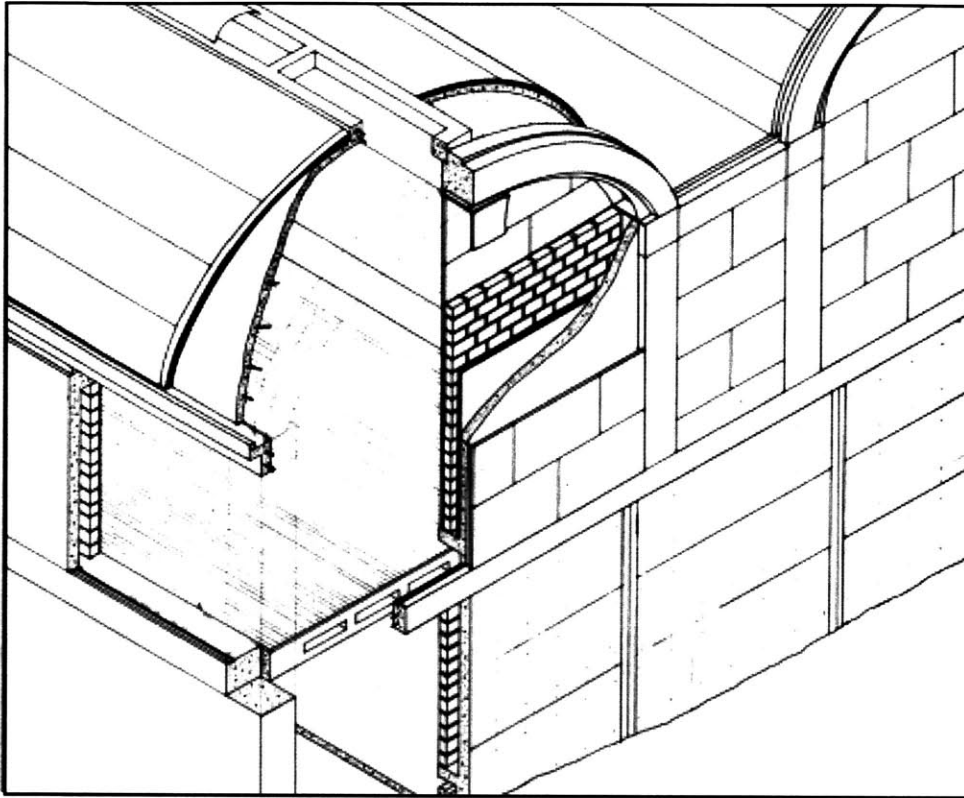


62. Diagram of typical Kimbrell vault. Post-tensioned steel cables provide lift to counteract deformation. The proportion of width to height to length is represented accurately.



63. Axonometric of Kimbell vault section. The linear oculus at the apex separates the vault into two curved beams. The slit occurs where compressive stresses are maximum.



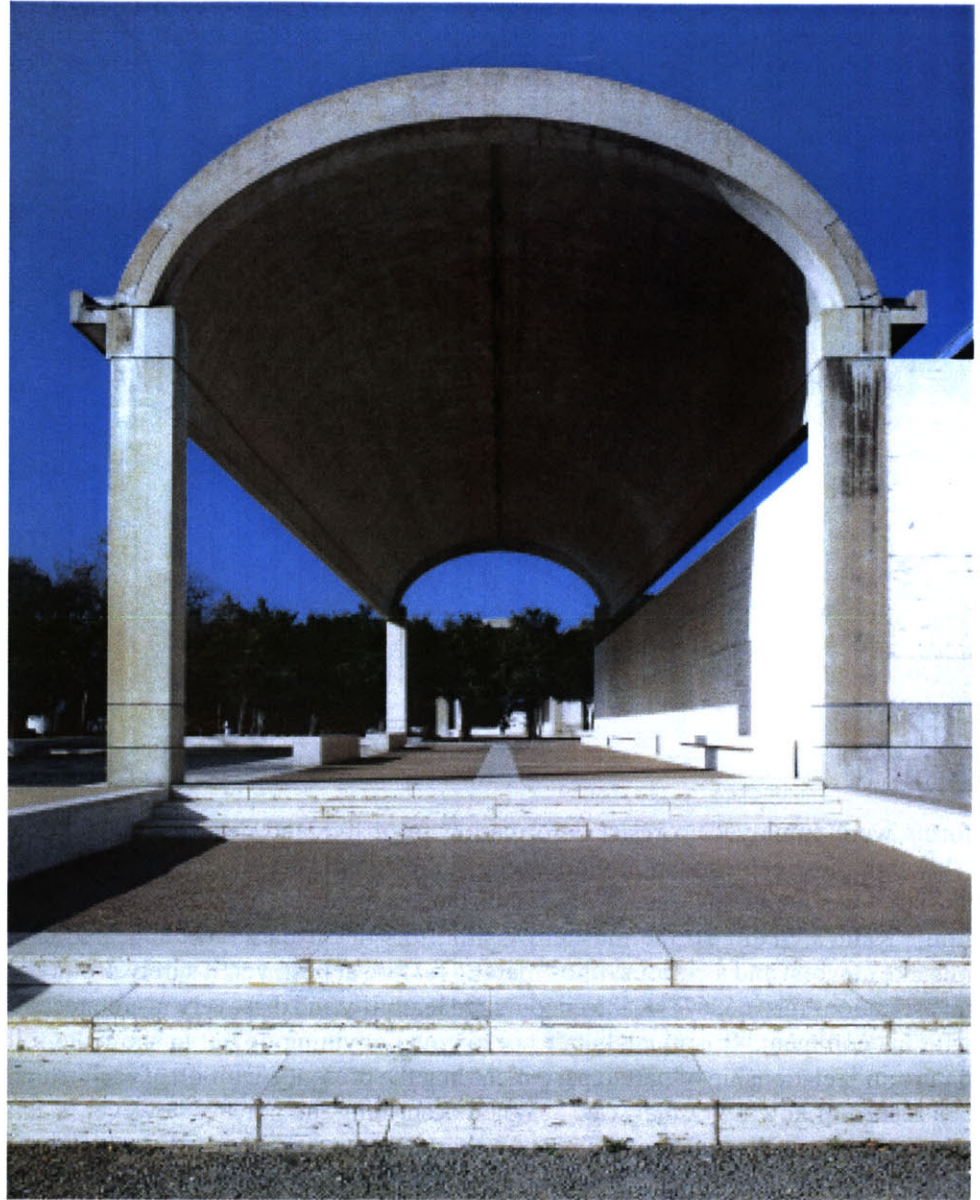


64. Isometric drawing of construction components. The vaults are infilled with travertine attached to concrete-block walls for the main gallery floor, and rest upon cast concrete foundation walls. The steel cables cast into the vaults can be seen protruding in this cut-away drawing. Floor is cast concrete with voids to produce two-way slab action and also reduce dead load.

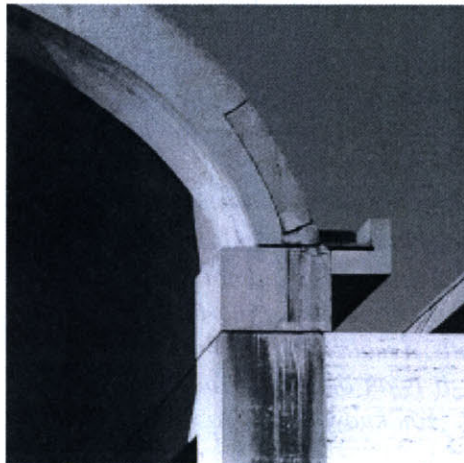
forms were employed to resist deformation from live and dead loads (fig. 62). Although these cables were not apparent in the completed building, the concrete used to cover their ends was left visibly distinct on the end arch stiffeners, much to Louis Kahn's credit. To the museum visitor, this detail may have appeared as a mistake at worst and a curious, idiosyncratic feature at best, yet, it surely prompted investigation (figs. 66, 67). Kahn encouraged legibility and discovery in architecture with his comment, "It is much better not to cover anything up but to show the full nature and relationship of part to part, including the present condition of each which is a record of how it got that way." When describing the porches however, Kahn chose to emphasize his poetic opinions rather than structural concepts, which may have been too complex for the average layperson. Thus Kahn paradoxically described the porches as indicative of the entire design, although he realized that there were two types of structural conditions for the vaults,...but only one expression. "The slit, together with the addition of stiffening beams along all four edges complicates the structural behavior of the roof beyond the intellectual and visual comprehension of most architects and engineers. Kahn's aspiration for an order which is completely clear is almost impossible in this case."²⁹ -McCleary (fig. 63).

Because of the open porches, how the building is made is completely clear before you go into it. It is the same realization behind Renaissance buildings, which gave the arcade to the street, though the buildings themselves did not need the arcade for their own purposes. So the porch sits there, made as the interior is made, without any obligation of paintings on its walls, a realization of what is architecture. When you look at the building and porch, it is an offering. You know it wasn't programmed; it is something that emerged. You know what's so wonderful about those porches, they're so unnecessary.

65. View through southern exterior vault. Artificial light is centered on the underside of vault to produce downlight- and perhaps similar to natural light. This solution may have been chosen to ensure that the exterior vaults' underside will always be in shadow. Notice that the oversized marginal beams are supported by the cycloid shells, and could have been eliminated for the exterior porches.



66, 67. Detail views of exterior vault. The use of steel cables in the vault's construction is made evident on arch ends through reveals.





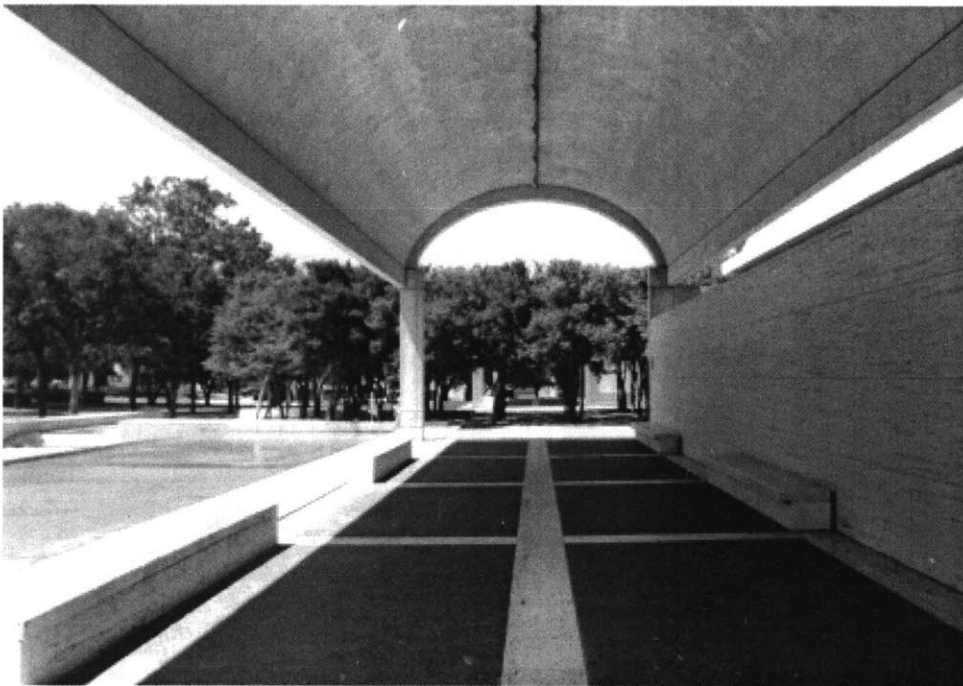
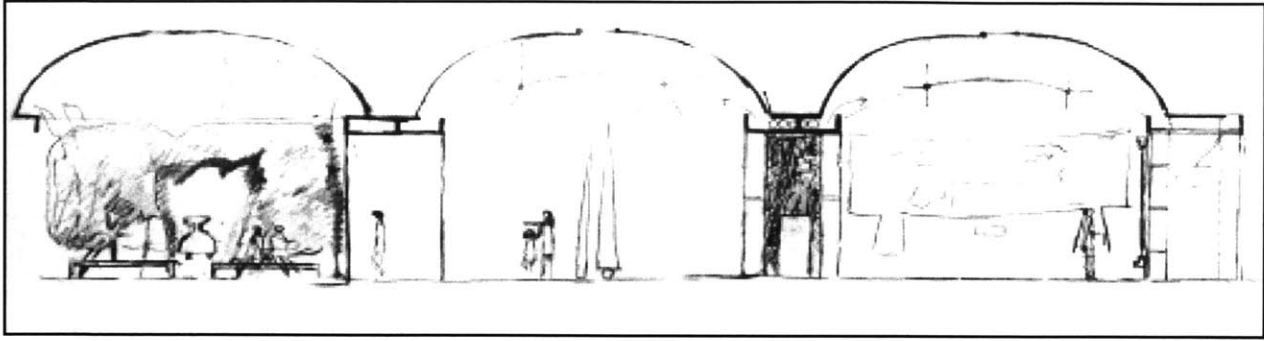
68. North elevation and southern porch. The columns connecting the porches to the building were articulated with exposed plug holes only on their southern side. This may have been an attempt to relate these columns to the lower level form work, or the concrete wall just behind the travertine screen wall (in shadow here). According to museum employees, Kahn did not want the freestanding columns supporting the porches to be scored at all, (similar to the columns connected to the main building), but this construction mistake was not caught in time to be changed. The porches are connected to the main building by travertine infill walls, clearly placed between columns.



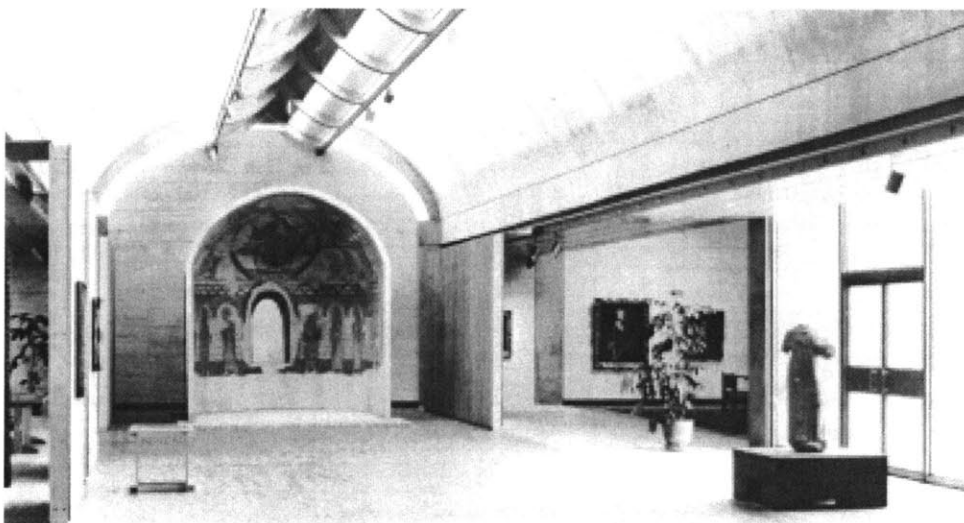
69. Exterior porch and pool. At one hundred feet long, the vaults are difficult to perceive in their entirety. The travertine wall at the rear yields visual stability to the streamlined form, aids in enclosing exterior space, and reinforces the image of the structure as a barrel vault.

It would seem that Kahn presented one building module in full view without functional obligations, in order to explain the logic of the entire composition. Judging the overall effects of his design more important than the actual structural behavior of individual components, Kahn utilized a form that looked like a vault, but did not behave like one structurally. Modern construction was exploited to express the vault-form's potentialities, enrich the entire design, and trigger opposing directionalities and movement within the museum. In this way, the thin-shell exterior porches along with the curved-beam roofs over interior spaces successfully created associations to archetypal form, while *simultaneously* stretching the capabilities of modern construction. The utilization of ancient vault imagery presented anew, and the modern technology of the thin-shell construction resulted in a design that fostered numerous, ambiguous readings. Yet, there was great clarity in the disposition of parts, such as the lower, flat ceilings for mechanical service and the natural light reflector that also housed movable, adjustable track lights. Kahn's ability to integrate all components of the building into a cohesive whole was dependent upon the vault's success, both individually and collectively, to express an ideal art museum born out of its own time. This of course set up a tension, that in some instances, (such as the auditorium and east entrance which will be discussed later), seemed disturbingly unresolved. "Kahn tries here to develop structure and space as a whole, so that a sequence of these units will finally form a new, higher unity for the overall space. Here the formal idea of the barrel vault struggles with the structural idea to dominate the expressive gesture, but the outcome of this struggle remains undecided."³⁰

For Louis Kahn, the true reading of all structural components was less important than the resultant experience of form, space and natural light. At the Kimbell Art Museum, he employed structurally ambiguous vault-forms which became a signature element. Kahn's vaults also facilitated spatial, mechanical, and lighting solutions that may not have been possible with a 'true' form. The vaults became a generating and organizing element in the design that ordered light, mechanical services, room sizes, building height, sequence of spaces, structure, materials, and even exterior spaces. Kahn illustrated the importance of space and light *derived* from structure, in a sectional sketch (fig. 70), of three adjacent vaults, with an exterior porch located on the far left. Beyond this vault, Kahn indicates trees approximately the same height as the spring of the vault (fig. 71), with an integrated horizontal channel for the 'served' space. A sculpture with seating is centered on axis with the porch beyond. The sketch shows a range of artwork, from the tallest pieces in the center vault, to a long, curved piece mounted on a freestanding panel on the right. This sketch predicted a reading, or experience of the realized building. Based upon this sketch, it seemed clear that the vaults were a deciding factor in the design of the Kimbell from the outset, with all subsequent decisions related to this elemental unit. "It does not really matter here if, as the associated engineer pointed out, the structure is not what it seems. The thing looks structural, primitive, and repetitively ordered all at once. It has solemn weight. Its presence remains awesome, and it is still one of the most telling of modern works to be seen anywhere."³¹ At the Kimbell Art Museum, Kahn's words gain significant weight, "engineering is not one thing and design another. They must be one and the same. A building should show the way it was made. Ornament begins with the joint." Louis Kahn's description of the porches as indicative of the building was appropriate, and also indicated another interpretation of his "offering to architecture,"...that the building reveals itself.



70. Section sketch through three cycloid vaults, September 1967 by Kahn. The relatively low height of the cycloid vault provided the interplay of lofty, gallery spaces juxtaposed with low, servant zones between. Kahn has stretched the width of the vaults to emphasize a horizontal, spreading quality. Porch on left does not have a skylight or reflector, yet it is similar in size, shape and volume to the rest. A curved panel is shown centered under vault on the left for a special art installation.



71. South portico of the Kimbell Art Museum at noon. As an amazing realization of Kahn's design, the holly trees at the Kimbell are perfectly scaled to match the spring of exterior vault.

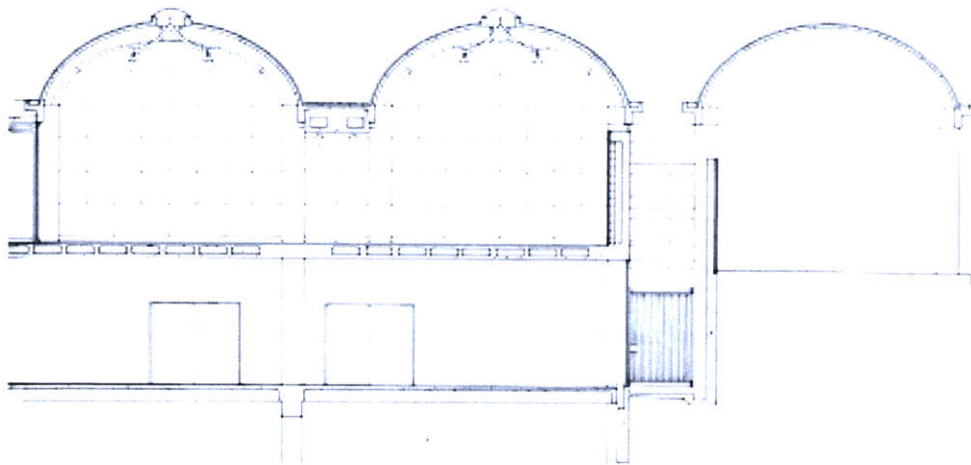
72. South gallery. The vaulted gallery room is separated from light court on the right by a change in floor material and a lower ceiling for the service zone.

73. Northern portico.
This view shows the
diagonal relationship
between the service
area on the side of the
building to the main
entrance at front.



74. Southern portico in
summer. The exterior
vaults are not equipped
with skylights, and thus
remain in shadow. The
oversized gutter creates
a strong shadow line and
substantial, crisp
building edge. Gutter
and marginal beam to
which it is attached are
supported by the vault.
Andes black granite is
used for pool lining and
curbs.





75. Sectional drawing through interior and exterior vaults. The exterior vault has the same articulation as all others except for the skylight. The space located between the interior and exterior vaults provides light for the lower level.

“Most clearly appreciated in the two open porticos, the sheer delicacy, span, and loft of these [vaults] is instantly impressive. They seem to float almost unnaturally, lofted by...one cannot say. The source of their strength is invisible. The columns are so slender, and, set impossibly far apart at the very corners, they deny the burden of their burden. Yet there is pain here, a tension under the serenity and ease of the geometry both literal (the cables within), and phenomenal. Kahn, always interested in the nature of structural materials, is not content to use materials without asking something of them, without shaping them to express their inherent limits. The result is paradoxical, or should one say tense?”³²-Benedikt

76. Northern portico in winter. The Kimbell’s horizontal character is made more evident when trees are barren. Cedar brown marble chips are left loose on pathways, but set in concrete under vaults. Unfilled travertine is used for steps, benches, and paving trim.



Structure As Giver Of Light

Silence to light, Light to silence.

The threshold of their crossing

is the singularity, is inspiration where the desire to express

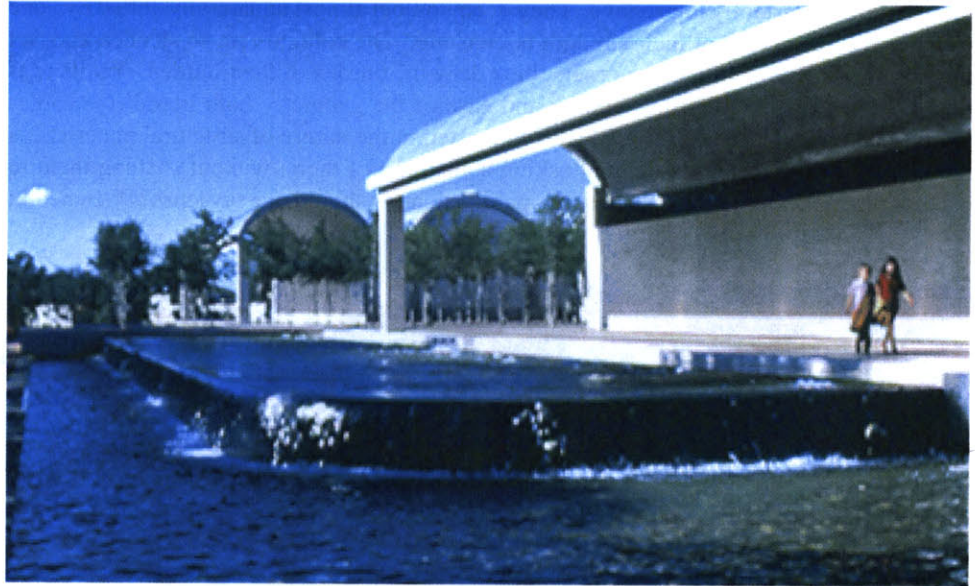
meets the possible is the Sanctuary of Art,

is the treasury of the Shadows.

Material casts shadows, shadows belong to light.

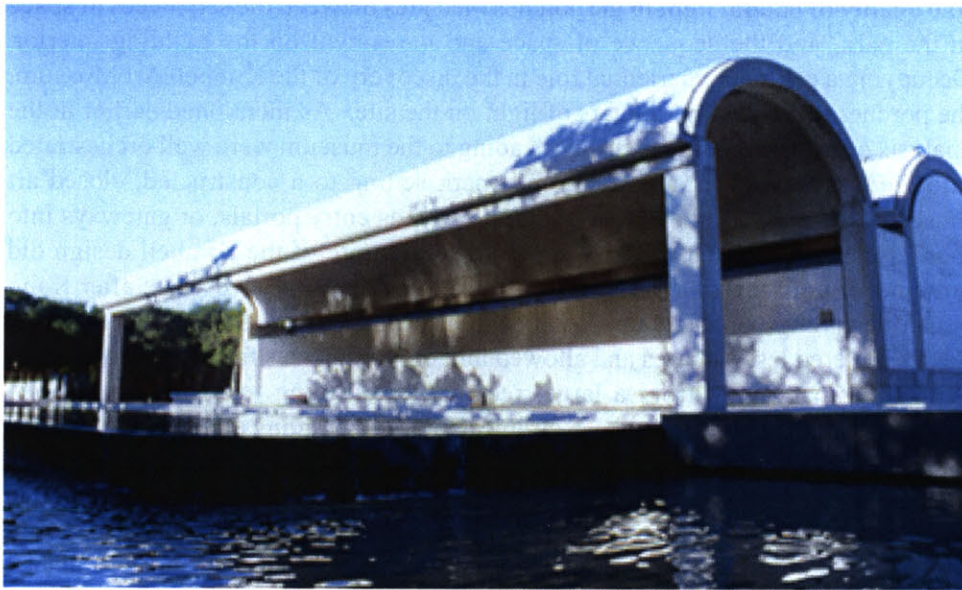
A building begins with light and ends with shadows.

77. View of thin-shell porticos. Seemingly floating on air and water, the vaults require the travertine walls to visually hold them to the earth, and equally important, to receive their shadow. The exterior vaults can only illustrate the absence of light with surfaces intended to be dark.



The Kimbell Art Museum vaults generated unparalleled responses to natural light, and illustrated Louis Kahn's description of structure as a giver of light. Similar to his other poetic ideas about architectural design, this comment encouraged several valid interpretations. One telling example of Kahn's elusive words used to illustrate his built architecture focused upon the Kimbell exterior porches. On one occasion Kahn described the exterior porches as indicative of the entire building, and on another, he ironically pronounced them unnecessary. This comment focused attention towards a certain ambivalency, or multivalency that existed with the vaults, and also highlighted their subjective, experiential readings. The analysis of the Kimbell vaults uncovered a tension between their misleadingly simple image, and their complex structural manifestation. Despite the clarity and simplicity of the ground plan and elevation figures in Kahn's architecture, their structure is not directly evident: it has to be decoded.³³ Added to the difficulty of correctly reading the Kimbell's structure, the qualities of natural light that were always so central to the design have remained, sadly, unexamined. Of course it has always been chal-

lending to analyze the qualities of natural light in any building, and certainly the unusual and dramatic types of light at the Kimbell reinforce this observation. Yet Kahn's poetically obscure descriptions of the Kimbell have successfully rendered observations based solely upon scientific, quantifiable methods inadequate. In terms of natural light at the Kimbell Art Museum, four (and admittedly personal), categories of light derived from the structural vault system emerged as most useful. That these categories may not reflect Kahn's own artistic goals must be made clear, and hopefully the points raised in here will be plausible, if not factual. Therefore, the review of natural light at the Kimbell has been divided into four, distinct sections: first, the intended absence of light counterbalanced by light reflected from below the porches, second, the 'slice of the sun' that created a line of light admitted from the vault's apex, third, the diffuse, silvery, reflected light on the gallery ceilings, and finally the light that entered the museum horizontally through vertical glazing. As Kahn's words cleverly called attention to the condition of light that the porches provided, the discussion of natural light in the Kimbell begins with its absence.



78. View of exterior porch. The portico receives light reflected from a pool of water at the close of each day. Designed to reflect natural light up from a pool of water, this strategy is a rare occurrence in modern architecture, with few noteworthy examples outside of MIT's chapel designed by Saarinen.

Structure is the giver of light. No space, architecturally, is a space unless it has natural light. I am designing an art museum in Texas. Here I felt that the light in the rooms structured in concrete will have the luminosity of silver....this light will give a glow of silver to the room without touching the objects directly, yet give the comforting feeling of knowing the time of day. So this is a kind of invention that comes out of the desire to have natural light.

With this simple observation, Louis Kahn called attention to the subtle nuances of light made possible by the vaults, and the pivotal role that they played in the experience of art, and the ambiance of the museum itself. As it was Kahn's way to express the limits of any system that he chose, the vault-forms at the Kimbell celebrated natural light in all of its conditions- from darkness to brilliance, day to night, from relatively horizontal to almost vertical, direct and reflected, and throughout the seasons. The mastery of natural light at the Kimbell illustrated the vault-form's flexibility and influenced the experience, or legibility of the building.

79. Pathway between building and “Entrance of the Trees.” Both the trees and porticos provide shade and define movement aligned with the grain of vaults. The water levels in the lower pools are almost flush with adjacent ground levels. Emphasizing the graining or directionality of the design, the front steps are oriented perpendicular to the central axis of the building, but parallel to the vaults.



Shadows Belong To Light

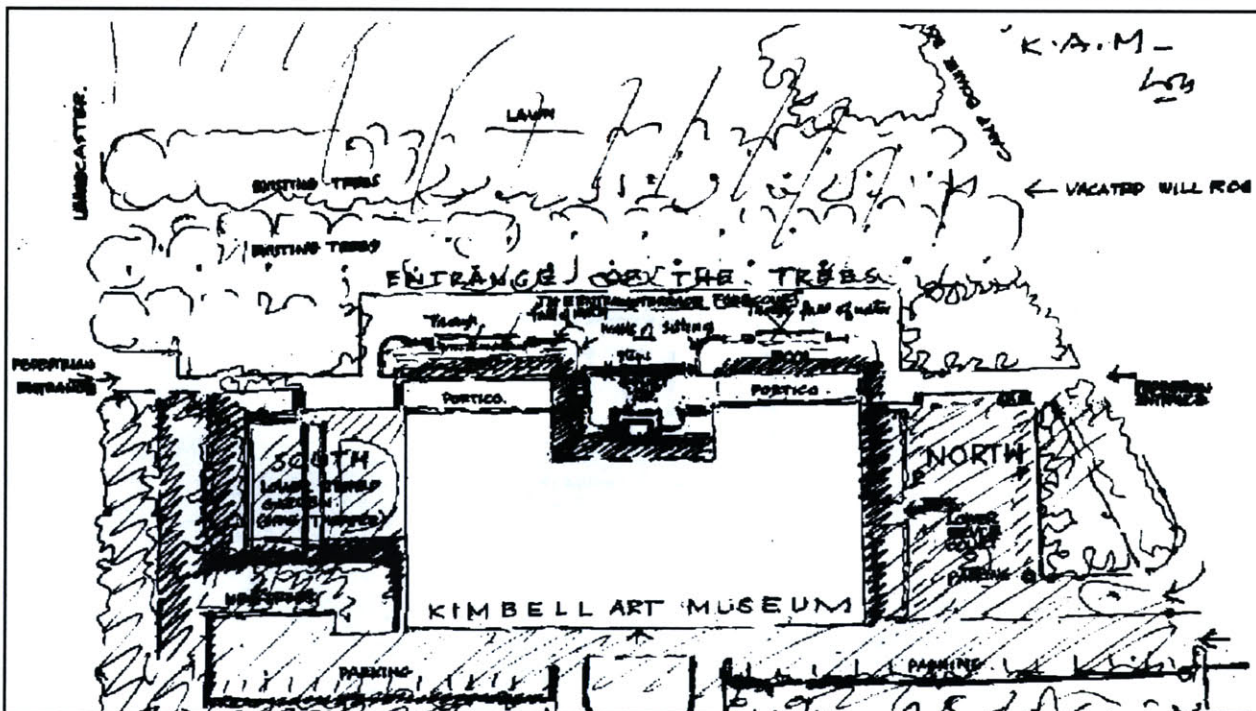
The quality of natural light in the porches mediates between the sequences of space in the park, and the sequence of space and movement on the building interior. Occupying a central, experiential role in the discovery of the Kimbell Art Museum, the porches served as modulators of light on the site. As mentioned earlier in the analysis of site design, the pathways leading to the museum were well orchestrated into the transition from a natural, open park setting to a constructed, closed art museum. As a result, the exterior vaults served as entry portals, or gateways into the museum interior. However, this significant feature of the Kimbell design did not emerge until the final site plan was developed in 1969, two years after Kahn began designing. Considerably smaller in size than previous schemes, the final design covered less site area and allowed longer promenades from adjacent streets. With the move away from a large, rectangular building to a small, u-shaped arrangement, the porches became possible as site and building amenities. This new arrangement emphasized the axuality of the existing trees, and presented open portals to visitors entering from the park. In Kahn's sketch for the layout of the site, the upper level entrance is located just beyond the exterior vaults labeled porticos (fig. 81). The porches therefore signaled the beginning of the built form, and established the character and style of the museum. But the porticos do not provide the same light as the interior vaults, their quality of light is most similar to the pre-existent colonnade of trees. That the exterior vaults introduced the role of natural light on the museum interior by paradoxically presenting the opposite condition on the exterior, established experiential ambiguities important to the comprehension of Kahn's design. Located between the colonnade of trees and the building, the porticos appeared to be a part of the site design and simultaneously a part of the building design; they work equally well as site features and building components. Kahn labeled the parallel rows of existing trees as 'The Entrance of the Trees' for reasons that might have related to the porches, as they both provide shade and establish a strong directionality, or graining. The porches provided a welcomed protection from the harsh sunlight often found in Texas, and defined exterior, shaded spaces similar to the shade of trees. Inside the building, the vault structure allowed natural light to enter from the sky above, but the outside vaults revealed a decidedly different realization of light. Kahn's site plan sketch illustrated the harmonious role that the porticos played in the sequence of spaces and movement on the site, but it also



contained a clue to his ideas about their qualities of light-the exterior vaults are separated from the main body of the building with a dark line. This line may have suggested that the porticos were conceptualized differently from the enclosed building. Moreover, the open exterior porch placed directly in front of the entrance doors was shown exactly the same as the remaining building mass, without a line dividing it from the rest. Thus based upon these two observations, Louis Kahn may have intended to give the porticos a different articulation and response to natural light. Thus it may have been anticipated that the two symmetrical porticos would offer a quality of natural light distinct from all other vaults, including the vault that shades the entry doors. In this way, Kahn's use of the word *portico* may have indicated that unlike the porch over the building entrance, the exterior vaults on either side of the entrance were designed to create a multivalent experience. The

80. Exterior portico. The trees effectively screen the museum from adjacent streets, creating an idyllic, contemplative setting for an art institution. This view presents two, equally compelling directions for entering the building- one leading around the pool, and the other leading straight through the portico. Existing trees and holly trees planted in between porticos seem to merge, and bisect the building.

81. Site sketch by Kahn, 1969. Bottom half of drawing shows the building layout shaded darker than the top portion of site. The line that separates the porticos from the main building mass demarcates a link between site and building.

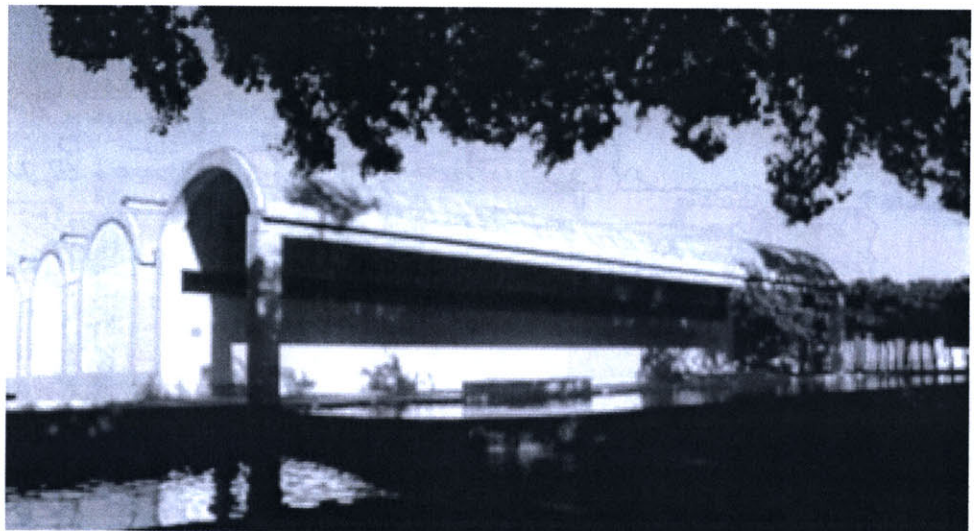


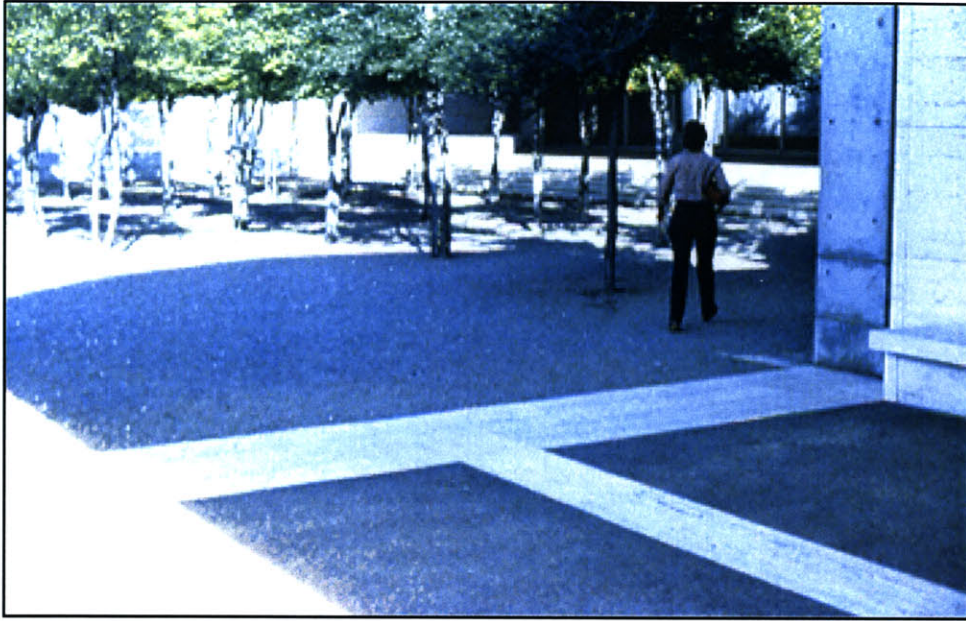
82, 83. Shaded seating of portico. Exterior porticos provide contemplative places to sit in the shade beside the soothing sound of water. The movement from outside to inside is enriched by several changes in scale, material, light and orientation. Color of water is reflected onto building, creating dynamic changes in the perception of the architecture. The exterior vaults receive light reflected off the water from the west, at the close of each day.



porticos therefore related to the transition from site to building, the parallel and perpendicular movement in relation to 'The Entrance of the Trees,' and the orchestration of natural light.

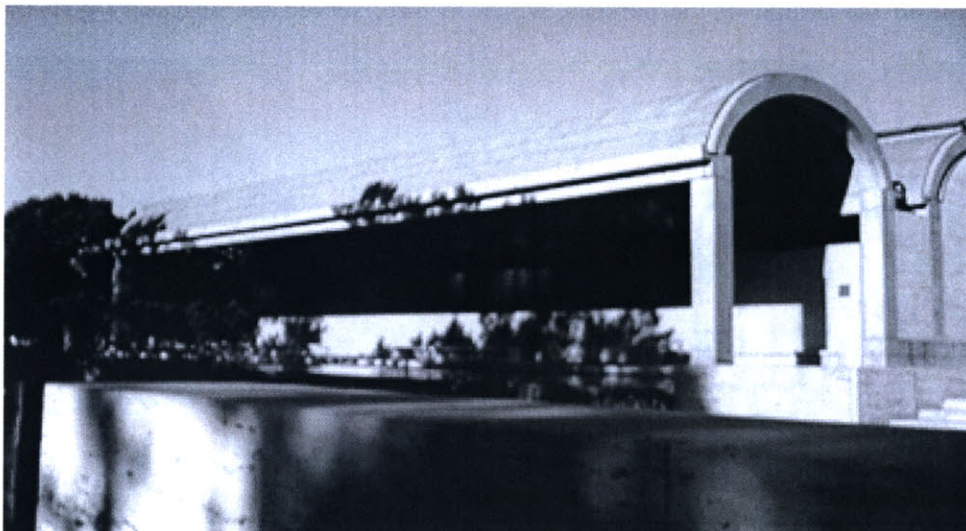
The exterior porticos provided natural light's antitheses- darkness, shade, and shadow in order to fully illustrate natural light, or in other words, the porticos provided necessary darkness to make the museum visitor acutely aware of its presence, and subtle qualities. Simultaneously, the exterior vaults along with their respective pools grounded the Kimbell Art Museum to the site in a poetic manner that recalled an idyllic oasis, protected from the sun. Thus the exterior vaults were quite *necessary*, as they completed the dialectical opposition suggested in Kahn's words, "Silence to Light, Light to Silence," by capturing in built form, one end of the spectrum of natural light- its absence. With the Kimbell porches, Louis Kahn was able to exhibit all of the conditions of natural light possible through the vault structural system.





84, 85. Shadow or portico. The porches cleverly emphasize light's absence through shade and shadow, marking the time of day and the seasons. Marble chips are cast into concrete walkways under porticos, and left loose under the holly trees. This simple change of material placement creates a surprisingly different sound and feel underfoot.

For the museum visitor emerging from the park, the exterior vaults not only presented the unit, or code for the entire building design, but also set up the unusual manipulations of natural light to be found on the interior. It seemed as if Kahn wanted to introduce an element of surprise, or what he termed *wonder*, to realize “structure as giver of light” by designing the porches as solid, thin shells in sharp, visual contrast to their surroundings, and the admission of light inside the museum. This has been a key point in the appreciation of the Kimbell Art Museum that has, unfortunately been missed by many. The exterior spaces defined by the vaults were apparently designed to be shadow, without top-light from the sun. Not only did this rejection of sunlight distinguish the porticos from the interior, but also facilitated another rare condition of natural light. Amazingly, the Kimbell porticos receive sunlight *from below*. As seen in one of the first models that Kahn’s office produced, pools of water were located adjacent to the exterior porch located at the park-side building entrance (fig. 76, p. 46). Light was therefore always reflected off of the



86. Exterior vault. The porticos suggest a tunnel or barrel vault through which movement occurs, and also act as beams framing the view made possible by a large opening.



water next to the building, up into the vaults' exterior space. This light has been described as a shimmering, dancing light that acts a dynamic counterpoint to a seemingly rigid building.

Eloquent compliments on the quality of light found in the galleries have been the norm, but oddly, not much has been offered to convey the importance of this special light in the experience of the Kimbell by critics. Kahn's own words have captured some of the porticos' ambiance, and his intentions, "[The same vault formed the exterior porches] like a presentation, like a piece of sculpture outside. It was a place of rest, an architectural introduction not called for in the program, an offering, without any obligation of paintings on its walls. [It was not] the solution of a problem but a presentation of its spirit, an offering to architecture itself. So the porch is part of that. This is Kimbell." Although the primary responsibility of the porches was to shield visitors by rejecting the harsh Texas sunlight, even these forms designed to be dark received some natural light, uniquely their own. The presence of moving water and its variable reflectivity thus served an indispensable role to the design of the porches, which in turn, served the necessary goal of

88. North pool. The free ends of the pools are curved, and relate to the vaults' shape. Building seems to step down extend toward the park through level changes and increasing levels of transparency and reflectivity.

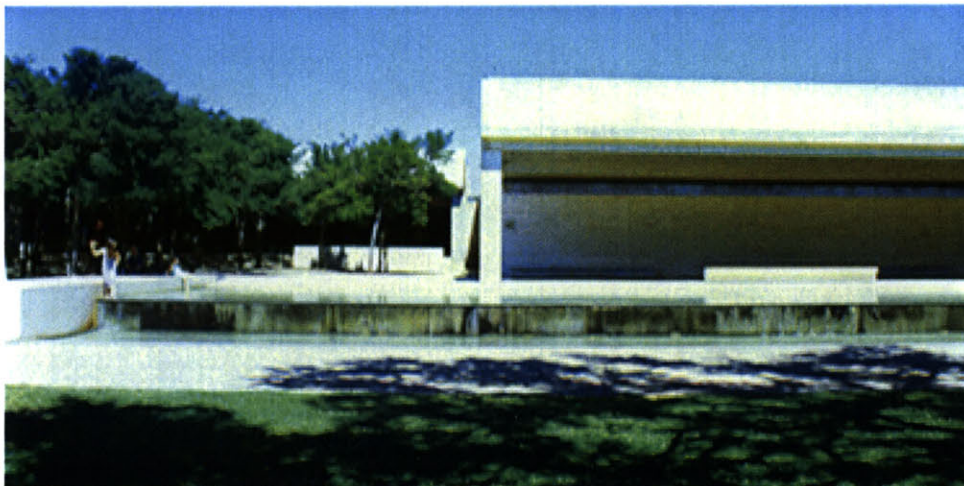




87. Porch over upper level entrance. Solid vault at the entrance mediates between exterior and interior illumination. Reflection of vault in glass illustrates how necessary the separating 'servant' channels are to the autonomous expression of each vault unit. 'Beams' at the bottom edge of vault sides hang from the vault, and enhance the overall form's function as a beam, itself framing an opening and encouraging perpendicular movement. That this same, subtle articulation works equally well in suggesting movement in the opposite direction, parallel to the vault, is a detail not immediately discerned. The porches introduce the materials, scale, order, and light of the interior.

illustrating the rejection of light. It has been this duality, or symbiotic relationship between darkness and light that has made the exterior porches so essential to the comprehension of the Kimbell Art Museum, and yet, Louis Kahn ironically suggested that they were unnecessary. The porches gave museum visitors the elemental unit that ordered the building and site design. Through fragmentation, the porches unfolded the puzzle about how the Kimbell was placed on its site, how the building was constructed, and how light shaped the experience of a museum. "Both [interior and exterior] begin with the concept of the unit of space as an increment of function. In both, this unit of space is also an increment of light."³⁴ The museum's interior light required the darkness of the exterior porches for appreciation of the design.

We knew that the museum would always be full of surprises. The blues would be one thing one day; the blues would be another thing another day, depending on the character of the light. Nothing static, nothing static as an electric bulb, which can only give you one iota of the character of light. So the museum has as many moods as there are moments in time, and never as long as the museum remains as a building will there be a single day like the other.



89. Front entrance from the park. Natural and man-made building screens define spaces and block views. The pools have become a favorite entertainment for children and adults alike.

90. Line of light in Lobby. The line of light moves from the entry doors on the right, across the lobby floor, down the stairs, and ends its journey on the wood-paneled wall on the left. The line of light on the floor must be crossed to enter the building, as a ceremonial rite of passage.



A Slice Of Sun

The second condition of light that Kahn introduced to visitors entering the Kimbell Art Museum from the park provided almost complete acceptance of the sun, as a memorable, jubilant celebration of the dynamic character of sunlight. Due to the brilliance of this type of light, only a few places within the Kimbell were allowed to receive the sun's full amount of heat, glare and intense illumination. These spaces that accepted the sun- lobby, dining area, auditorium, and library reading room, were group activity, social spaces of conversation, rather than art. Although the same reflector was utilized for these vaulted rooms as the galleries, the reflector was modified to allow more direct sunlight to enter. In this way Louis Kahn marked the programmatically special areas with a quality of light made possible only by the building's identity- the vault. After leaving the dark entry porch, visitors were immediately jolted by intense sunlight; it surprisingly appeared to brand the walls and floors with a line marking the time of day. Coming from underneath the shaded

91. Sunlight is allowed to pierce the vault reflector and illuminate a pathway between the galleries on opposite sides of the museum. The light flickers with the passing of clouds overhead. The space on the right-hand side of the lobby is an exterior court featuring Maillol *L'aire*. Wood paneling obscures the library behind from view. Paneling also enhances the emphasis on light, by providing an abstract, minimal lobby interior.



grove of holly trees and entry porch to the blazing interior, museum goers were confronted with an arresting line on the floor that literally connected the two halves of the building- *with light*. In opposition to the static characteristics of artificial illumination, the line of light sweeping across the lobby floor imbued the Kimbell Art Museum with energy and liveliness (fig. 90).

The two galleries were separated on opposite sides of the museum, but the path of light tied them together in a tangible, phenomenological manner (fig. 91). The Kimbell's symmetrical layout must have encouraged visitors to make typological references to other museums, as well as acknowledge Richard Brown's sensitivity to museum fatigue and way-finding (Appendix 3, I, C). The Kimbell therefore encouraged monumental, neo-classical associations with its symmetrical western entrance, typical of tripartite Beaux-Arts organization.³⁵ Yet, Kahn's sagacious manipulation of natural light found here in a museum designed for the harsh sunlight of Texas, gave a thoroughly modern interpretation to a classic institution. "The Beaux-Arts preoccupation with composition and ornament caused those uses of light almost to vanish from the vocabulary of architecture. By contrast, light had a profound structural significance for Kahn, besides being the source of poetic inspiration toward form. Perhaps more than any of his other buildings, the Kimbell Art Museum, a building that has been called a contemporary classic, revealed this concern for the use of daylight in a variety of forms. In Texas, the source of light always appears to be vertical, as if the sun were always at its zenith."³⁶ The Kimbell provided the opportunity for Louis Kahn to show by example, the importance of natural light to his design philosophy. From the first step into the Kimbell, the visitor was introduced to a mystical line of light that illuminated a pathway to art. Inferring from this atypical, ceremonial use of light for a museum lobby, Kahn may have wanted to literally divide the Kimbell galleries with a channel of sunlight, and simultaneously connect them as well (fig. 92). As illustrated in the accompanying photographs, the Kimbell Art Museum *does* have a slice of the sun.

A great American poet once asked the architect, 'What slice of the sun does your building have? What light enters your room?' -as if to say the sun never knew how great it was until it struck the side of a building.

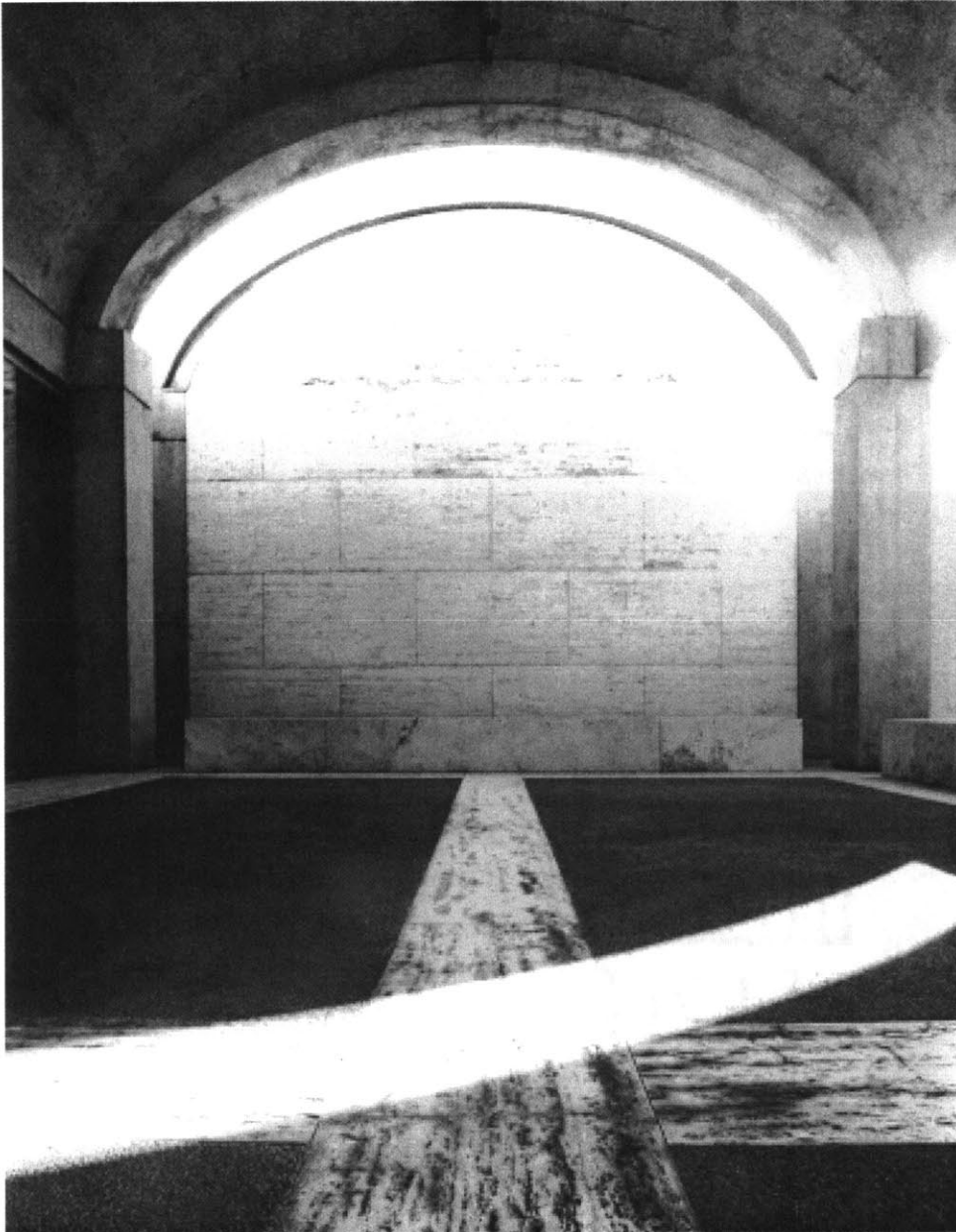


92. Line of light moves across lobby floor and even descends to lower level via stairwells placed in the servant zone. In this way Kahn has connected the two main floors of the museum, and their entrances, with light. The light records the passing of the sun, and a day spent immersed in art. Each half of the building's galleries can be closed with folding partitions to change exhibitions.

93. View of interior dining area. The auditorium is located on the left, and the exterior dining court is on the right. The entrance lobby can be seen beyond, looking diagonally through layers of glass. The line of light apparently dictates the arrangement of tables and chairs, as if the sliver of space branded by sunlight could not be occupied.



Based upon his words, the exterior vault imagery, and the interior lighting effects that he achieved in the Kimbell Art Museum, Louis Kahn seemed intent upon making an association to other great structures from the past. The natural light found in the lobby, dining area, auditorium and reading room actually recalled that famous masterpiece, the Pantheon. Now of course it was clear that the Kimbell was intended to be a house of art, not a grand temple, as and Kahn often utilized ancient imagery to evoke monumentality and permanence. Yet museum director Richard Brown wanted the Kimbell to be influenced by the changes in weather, the seasons, and the position of the sun (Appendix 3, V, A). Brown's interest in making natural light an integral part of the museum experience may have prompted Kahn to allude to the Pantheon's light.³⁷ Kahn's recurring, personal interest in fusing the man-made with natural phenomena yielded powerful results at the Kimbell that stressed



94. Swath of light slips between the gap that separates the entry porch from adjacent gallery. Professor Michael Benedikt has described this light on page 77 of his book, *Deconstructing the Kimbell* as “a marginal event—one that can happen only in one location in the building, and at certain moments of the year and day, moments themselves insignificant” incorrectly. The crescent shape of light seen here occurs on the southern exposure of all vaults. This is due to three-foot wide gaps that separate the three rows of vaults (see site plan, fig. 46).

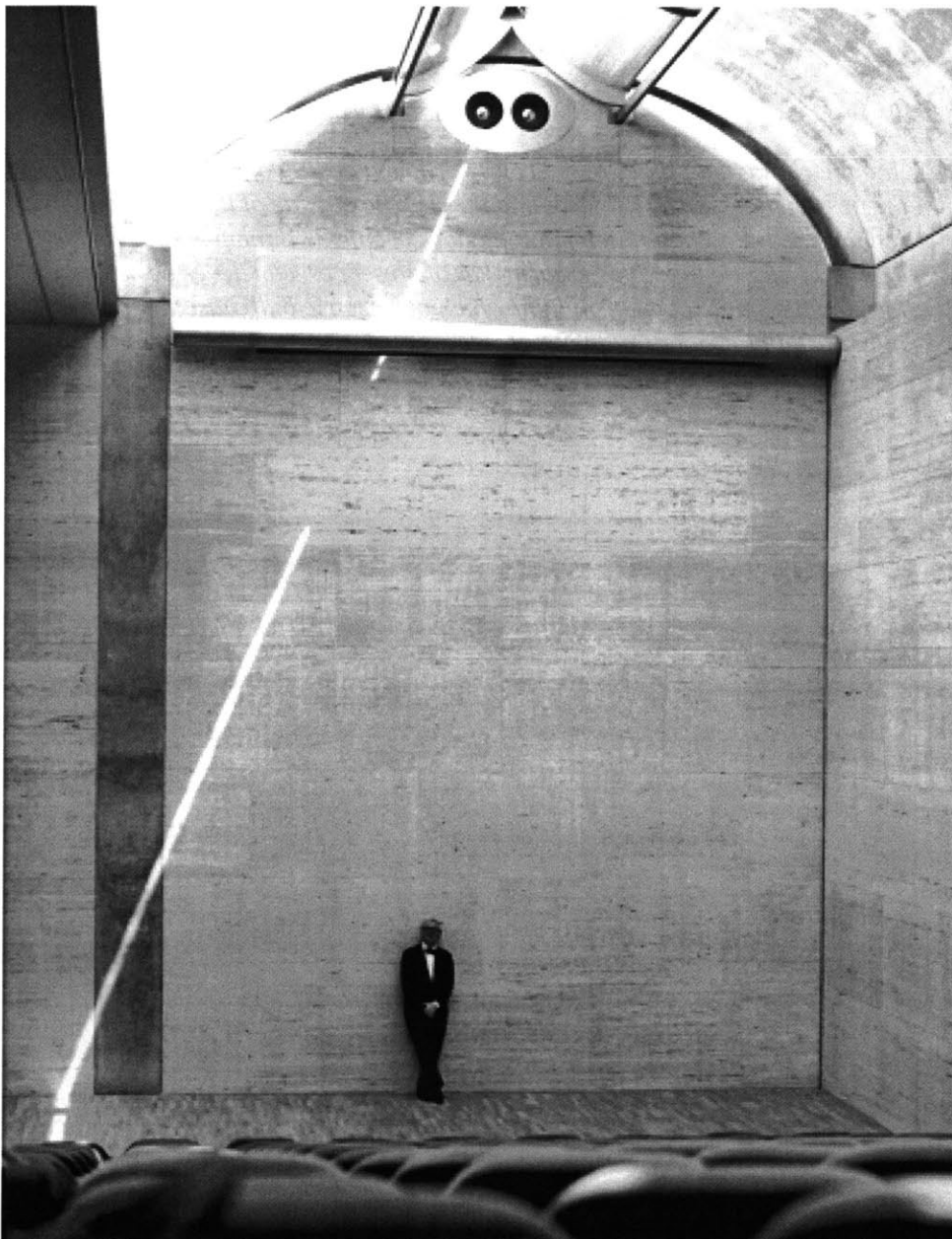
the experiential side of architecture. With the Kimbell Art Museum, Louis Kahn harnessed a quality of light that alluded to the past, recorded the time of day, the cycle of seasons, and the passing of clouds. Moreover, it was through lighting effects that the vaults demonstrated ambiguity—both accepting damaging daylight through skylights, and reflecting it back up to the ceiling, away from the art. As Kahn predicted, natural light allowed through the vaults completely changed the Kimbell from each year to season, month to day, and even minute to moment. From subdued, shadowy light of the porches to blazing, forceful light branding the lobby, the mastery of natural light at the Kimbell Art Museum demonstrated the potentialities of modern construction, and simultaneously established a legible relationship to ancient, ritualistic architecture. Like the vault-form, the shafts of light directed inside the Kimbell interior convincingly recalled ancient structures.

When Hadrian thought of the Pantheon, he wanted a place where anyone could come to worship. How marvelous is this solution. It is a non-directional building, not even a square, which would give, somehow, directions and points at the corners. There is no chance to say that there is a shrine here, or there. No. The light from above is such that you can't get near it. You can't just stand under it; it almost cuts you like a knife...and you want to stay away from it. What a terrific architectural solution. This should be an inspiration for all architects, such a building, so conceived.

95. The Pantheon, Rome, A.D. 120 - 4. Vault is both inside and outside shape, with primarily one source of light from above at the apex. A key to the Pantheon's success is its geometrical purity and relative darkness provides necessary contrast for the shaft of light from the oculus, which marks the time of day and the seasons. Both buildings celebrate the capabilities of concrete, and push the material to its limits. Kahn's vaults can be conceptualized as one, pure form-unit replicated to build up his design. On a rudimentary level then, the Pantheon seems to have been a plausible precedent for the Kimbell Art Museum. *The Interior of the Pantheon* by G. P. Panini, c.1750.

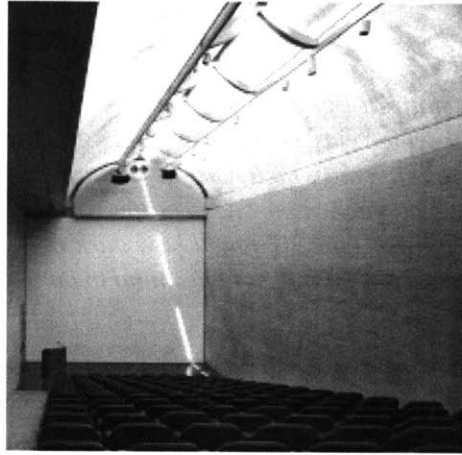


When a man says that he believes that natural light is something we are born out of, he cannot accept a school which has no natural light. He cannot even accept a movie house, you might say, which must be in darkness, without sensing that there must be a crack somewhere in the construction which allows enough natural light to come in to tell how dark it is. Now he may not demand it actually, but he demands it in his mind to be that important.



96. Louis I. Kahn at the north wall of the Kimbell Art Museum auditorium prior to final inspection, August 3, 1972. Kahn's design for the projection screen soon proved to be inadequate- two slides oriented horizontally could not fit onto the relatively narrow screen due to the great distance away from the projection both. The screen was later removed and replaced with a fixed, solid white panel.

97, 98. Auditorium interior views. The screen is located at the far end of room, away from entrance and opposite the projection booth. The auditorium screen has been augmented by a fixed, wall-to-wall panel to accommodate slides oriented horizontally. Unfortunately this addition blocks the concrete column behind from view, and thus conceals the vault's structural support. All of the reflectors in the museum can completely block out sunlight with the aid of a felt insert, or remain relatively open in the center as seen here. The reflectors in the galleries however were designed to direct more light up onto the vault ceiling.



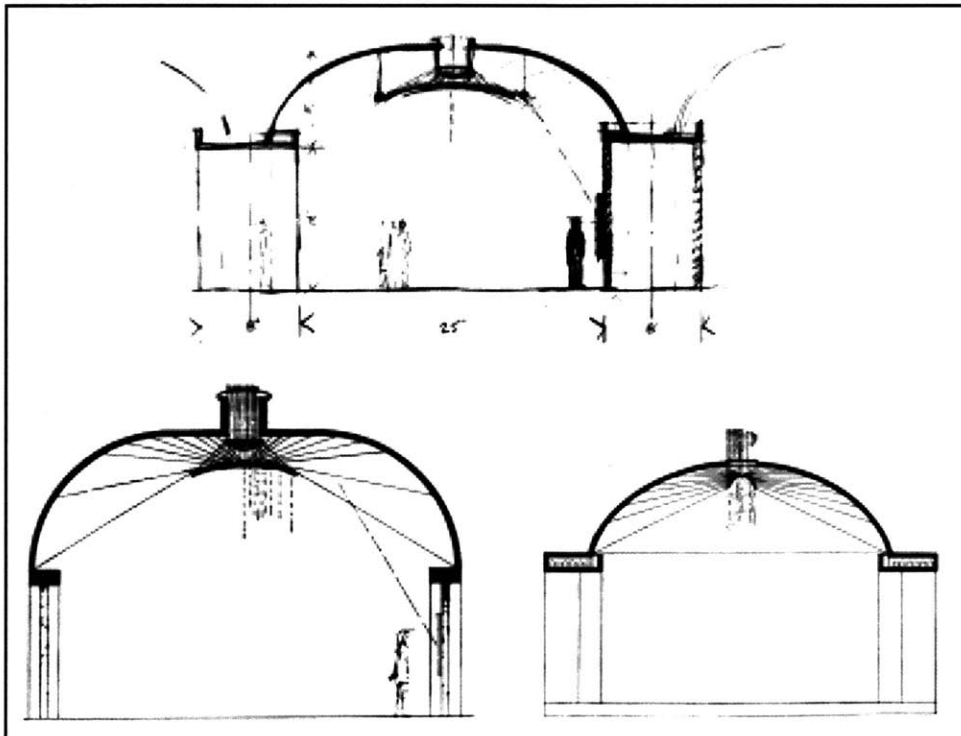
And the cloud that passes over gives the room a feeling of association with the person that is in it, knowing that there is life outside of the room, and it reflects the life-giving that a painting does because I think a work of art is a giver of life. So light, this great maker of presences, can never be brought forth by the single moment in light which the electric bulb has. An natural light has all the moods of the time of the day, the seasons of the year, year for year and day for day are different from the day preceding.

99. View of library reading room on mezzanine level. Due to the close proximity to the vault and reflector, the reader is immersed in strong sunlight from above, ...almost close enough and tangible enough to touch. Line of light at the floor level reveals the vault's structural autonomy from the floor, and its supremacy as a driving force in the Kimell design.



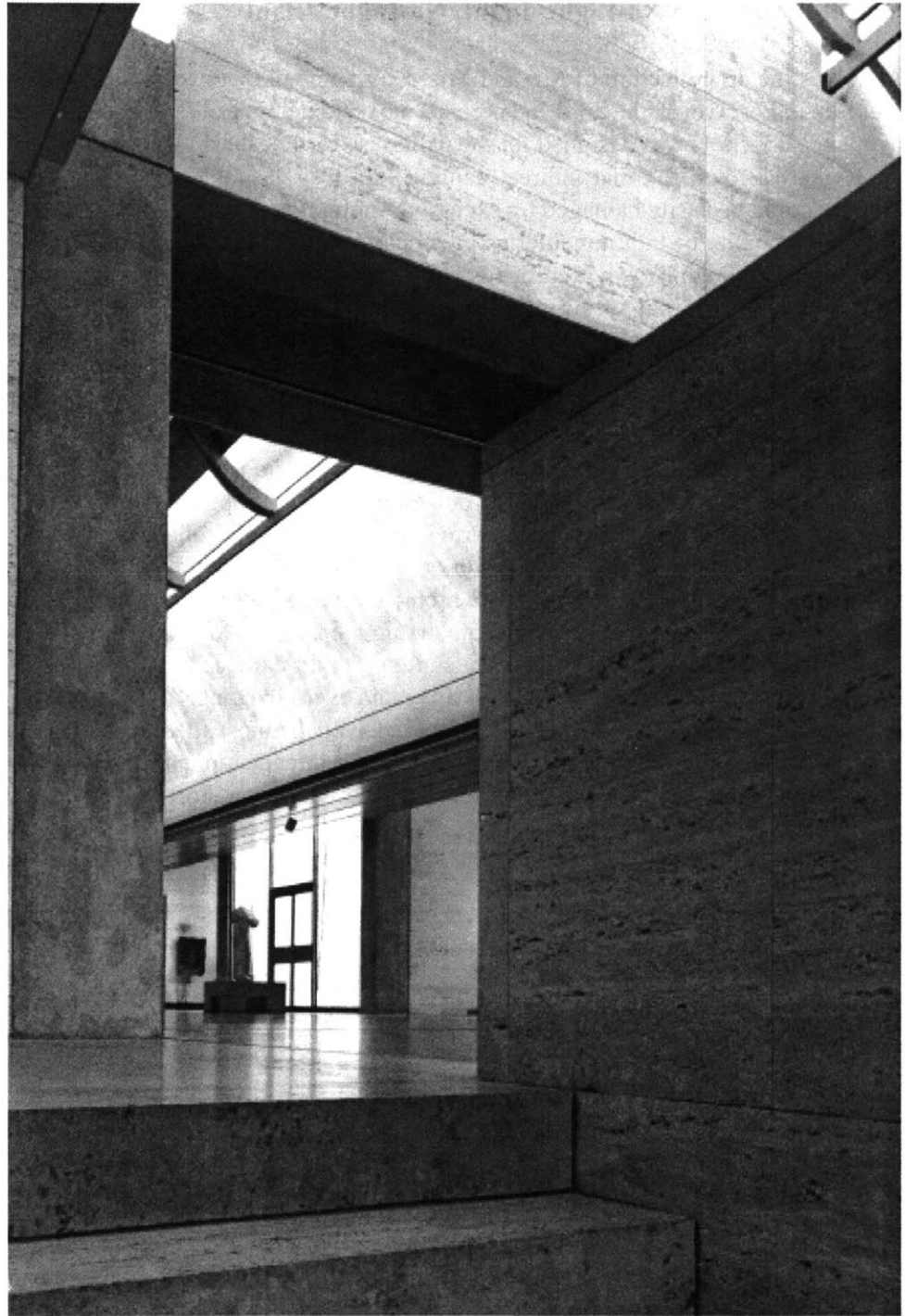
No-Light, Light, No-Light, Light

As it was the art collection of Mr. and Mrs. Kay Kimbell that necessitated a new museum in Fort Worth, the third and perhaps most crucial type of light experienced by museum visitors was designed for the galleries. Both Kahn and museum director Richard Brown felt that indirect natural light was desirable for galleries, as artwork could be easily damaged by excessive sunlight, and both paid close attention to the quality of light in galleries intended to exhibit the exemplary Kimbell collection. Although Brown specifically instructed Kahn on the quality of light for the museum, he did not specify the quantity.³⁸ It was predictable then, that the spaces Kahn studied first were the galleries, as rooms possessing a diffuse quality of light. It was also beneficial to Kahn that Richard Brown wrote an extremely detailed description of the type of light ideal for the museum. Brown's insights about natural light for the Kimbell were well considered and challenged Kahn to put his own beliefs about rooms with light into practice. As previously shown, the design of the Kimbell Art Museum began with roof/room forms equipped with light reflectors oriented north-south on the site. Providing an even light reflected down the concrete vault surfaces and then the works of art, all design permutations of the vaults addressed the need to modulate architectural space through natural light. This was a unique approach to conceptualizing a museum. Most museums used artificial light because the ultraviolet in sunlight could damage paintings. However Kahn preferred natural light, as it is alive and ever-changing.³⁹ Therefore, the galleries at the Kimbell have understandably received the most attention from critics for two simple reasons. First the galleries were intended to appropriately exhibit a world renowned art collection in an unlikely location, Fort Worth, Texas. Second, the galleries and their qualities of natural light was a driving force for Kahn's design process. In describing the Kimbell Art Museum, Kahn preferred to



100. Vault sketches, September, 1967. The flattened, curvilinear roof units show a central light reflector to block, soften, and redirect sunlight over the vault's ceiling.

101. Kimbell Art Museum interior, 1972. Visitors scending the monumental stairs from the lower level were rewarded with a glimpse of the south (or north) gallery, and its glowing light.



focus on the integration of the art with the architecture, as an offering to all men. That the solution realized by Louis Kahn for the Kimbell Art Museum has withstood extensive scrutiny, certainly contributed to the building's high reputation, and for its architect as well. Because the lighting scheme for the gallery vaults has received extensive exegesis by numerous scholars, a comprehensive review of this information was consequently not essential here. However, this third type of light made possible by the vault structure reinforced the graining effect so central to the ambiguous reading of the museum and to its experience.

In addition to illuminating art works indirectly, the Kimbell gallery vaults established a strong, easily understandable system of light and darkness, high and low spaces, servant and served spaces, and parallel and perpendicular movements. When seen in conjunction with the lower, flat-ceilinged servant zones of the building, the vaults created a rhythm of light and dark perpendicular to their axes (fig. 100). The pattern of lights and darks also runs perpendicular to the orientation of skylights. "The vaults run strictly north-south, so the most even light is at midday, and the bias shifts from side to side between morning and afternoon. When clouds pass, the change in light flickers dramatically through the length of the building."³⁹ Key to the organization of the museum, all of the vaults that composed the building (and skylights as well), were always oriented the same. This strict order was needed as a datum, off of which the dynamic qualities of natural light could be discerned. Thus the order of the structure, the order of the rooms, and the order of natural light was germane to the conception, and resultant experience of the Kimbell. Louis



102. Museum interior, 1972. View from north gallery wing towards the opposite, south gallery reveals the entire length of the building, its tripartite division, and the roof units placed end to end, separated by bulkheads. In contrast to what is often misrepresented in publications, this is the only completely open visual axis that Kahn planned for the final design. It is a singular moment of significant power. Although this long axis running with the vaults' grain overpowers its complimentary perpendicular direction here, diagonal views open the building to alternative routes and adjacent spaces. Even a vista intended to run the length of the building is cut into sections to frame the complimentary, cross-axial, perpendicular movements.

103, 104. Gallery interior. The amount of closure and openness experienced in the galleries is dependent upon the placement of the movable exhibition panels. When the panels are aligned with the vaults they enhance the discrete, room-like quality of each vault. Moreover with every ninety-degree turn, the reading of the space changes from a tunnel-like, axial room to a dammed, sequential rhythm of flowing space. Note how different the same space appears when viewed with the grain, (vaults, servant zone and exhibition panel), in contrast to the blockage that the panel creates when viewed across the building's grain. The space consequently seems to pulse- expanding and contracting to present long vistas in one direction and dead-ends in the other, like a labyrinth. The low, flat ceilings in between vaults align visually to create a compressed, horizontal space in one direction, yet they make the crown of the vaults seem higher, loftier, more brilliantly lit and distinct from each other. The low ceilings also make the vaults' proportions more impressive by emphasizing their reading as extraordinarily wide framed openings.



Kahn often used distinct, figural forms in aggregation, each having their own geometrical and structural logic. And the Kimbell design was no exception. Essential to appreciating the play of light in the galleries, (the most expansive spaces in the building), the vaults generated an order that contained opportunities for surprise, and concurrently limited the possibility for various, creative expressions. "With all its subtleties and contrasts of spatial sequence, one easily forgets what a systematic and repetitive building the Kimbell is, how strict in its geometry."⁴⁰ The rigid order and geometry of the design created a banding in the perception of the ceiling plane that consisted of light-vault-served space strips alternated with dark-horizontal-servant space to give the galleries rhythm and scale related to movement. Museum goers surely must have felt this rhythm when pacing the building, as if merely walking in the building was another means to comprehend the vaults and their impact.





By nature of the vault-like structure, you have the play of lofty rooms with a space between each vault which has a ceiling at the level of the spring of the vault. The lower space does not have natural light, but gets it from the larger chamber. In the loftier rooms, how the room is made is manifest; the dimension of its light from above is manifest without partitions because the vaults defy division. Even when partitioned, the room remains a room. You might say that the nature of a room is that it always has the character of completeness. Architecture comes from the making of a room. A room without natural light is not a room. Each space must be defined by its structure and character of its natural light. When a light enters a room, it is your light and nobody else's; it belongs to that room. The Kimbell Art Museum uses all natural light.



105, 106. Gallery interior. The movable panels rely upon the vault structure for stability and location. If the panels protrude under the vault as seen here, their visual and spatial impact changes with the vantage point of the viewer- when seen on axis with the vault, the panel seems to violate the room, but when viewed perpendicular to the vaults, the panels yield a complimentary division to the contiguous open spaces. Changes in the ceiling plane also register on the floor to illustrate a 'banding' of spaces. Perhaps by designing brackets that connect the panels to the building, Kahn has suggested that they should not be placed as free-standing, floating obstructions in the rooms. The panels seem to slide and float relative to the ceiling and floor articulation, yet remain pleasingly attached to the room structure. In this way Kahn has given primacy to the room unit, by not allowing changeable building components to overpower the fixed architecture. It would appear that Louis Kahn was unwilling to modify the vault form for anything, including the auditorium, the library, and even the exhibition of art.

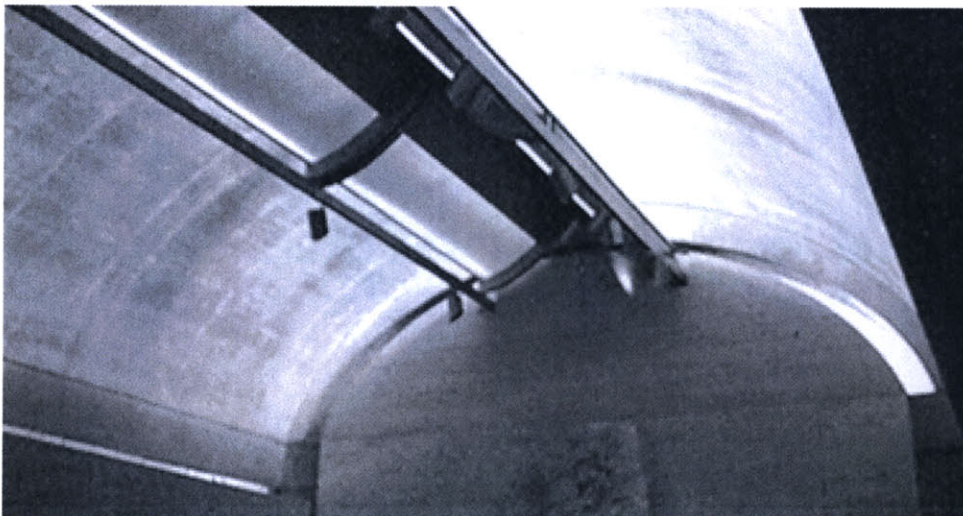
107-112. Movable panel arrangements. The sense of closure varies in relation to the vaults, and the movable panel positions. The exhibition panels also emphasize the diagonal relationships between columns and spaces, they direct views and reflect light. That so much variety could exist inside a building that may have seemed static from the exterior, must have been a pleasant surprise for museum visitors to discover. Vaults usually rest on side walls, not columns; this is a clue to their true nature. The vault is finite if supported on columns, in contrast to the (theoretically) infinite span possible with bearing walls. The numerous spatial combinations seen here would not have been possible if the vaults rested on walls. The columnar supports introduce two directionalities, and divide the roof into finite units. Thus the columns give scale, definition and rhythm to the vaults by *inducing* a spanning limitation. With the Kimbell, Kahn cleverly demonstrated a thorough comprehension of what the vault could, and could not do both structurally and spatially.



Kenneth Frampton has also commended the contrasting movements within the Kimbell, "These metal service boxes, together with the moving partitions that are bracketed off longitudinal tracks let into their form, enabled Kahn to orient the space of the museum into two countervailing and ideologically distinct directions; on the one hand, the traditional gallery as a discrete room, running in the same direction as the vault, on the other, the lateral expanse of space running across the vault, capable of providing a flexible, open floor area appropriate to a wide range of exhibition formats."⁴¹ The direction of movement from the site into the building lobby and finally moving across the vaults set up a surprise, and a conflict that charged the Kimbell with a palpable tension. Added to this play of movement, the movable panels that attached to the horizontal, servant channels increased the tensions already present. The exhibition panels either intruded perpendicularly into vault spaces and ignored the forms' overall dimensions, or in contrast, the panels aligned themselves with the vaults' long axes to create more intimate, parallel enclosures. Further, the panels were also allowed to slide over, into the vault space from connecting clips, designed by Kahn, to place them inside the vault-room, yet also making the vault's space narrower. Sometimes the panels were positioned completely under the flat ceilings, in effect placing their artwork in the servant zone, and a lower level of light. The movable panels thus made an enormous impact upon the visual and spatial openness of the galleries, and natural light.



Greek architecture taught me that the column is where the light is not, and the space between is where the light is. It is a matter of no-light, light, no-light. A column and a column brings light between them. To make a column which grows out of a wall and which makes its own rhythm of no-light, light, no-light, light: that is the marvel of the artist.



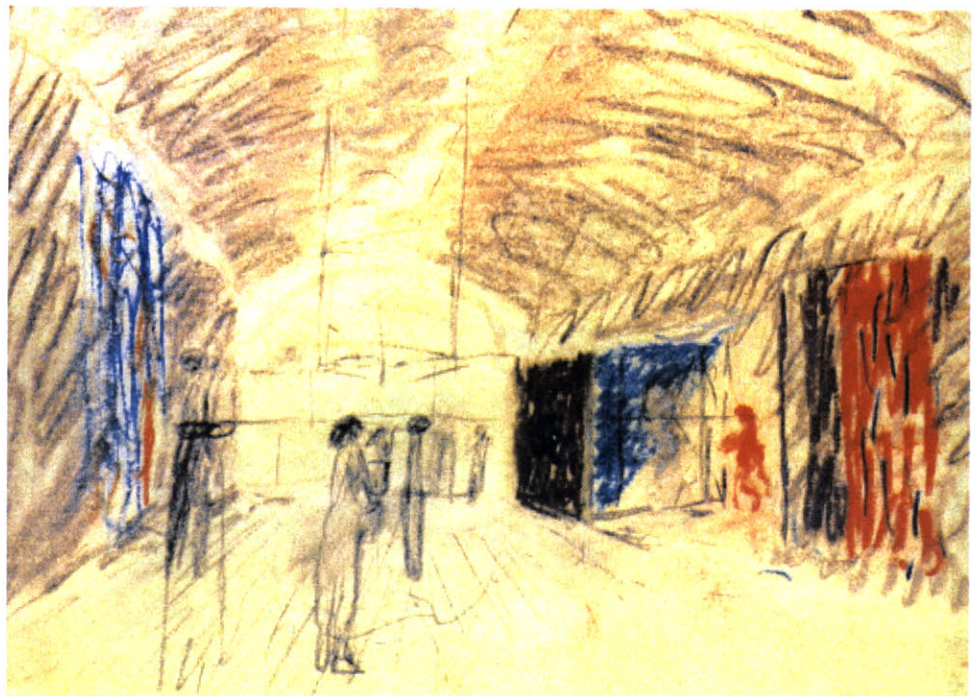
113, 114. Reflector located under vault skylight. The diffuse natural light that enters the galleries imbues the building with a soft, pleasing feel. The light from the skylight is balanced with light entering from the side, through gaps between the vault and infill walls. The exterior fountain court, shown in the top photograph, provides horizontal light, serves as a visual and spatial dam to the space, and makes the adjacent vault's span seem much longer.

115. Drawing by Kahn of Kimbell Art Museum interior, 1967. Kahn illustrates the quality of light he envisioned in a gallery room during the day. Vegetation can be seen in a large light court on the right, and there is reflected light on the vaulted ceiling. An opening to the sky in the vaults crown is obscured by what may have been a reflector. The proportions of the vault and the room are greater than the realized building.



The vaults are the essence of the building- the inspiration for the design as well as its task-master. It is the vaults that give the building its loftiness as well as its intimacy. It is the non-hierarchical vaults that give the building its order and rhythm. It is the vaults that lock the building onto its site, paralleling a double row of former street trees. But it is also the vaults that stiffen the museum's plan, forcing a number of building functions into spaces that are ill-suited for them. The vaults give the building its essence- and limits.⁴²-Speck

116. A Perspective sketch of gallery interior by Kahn, 1967. Colors indicate that the hue and value of all interior surfaces were considered, even at night, as demonstrated here. The relative darkness of each surface is represented.



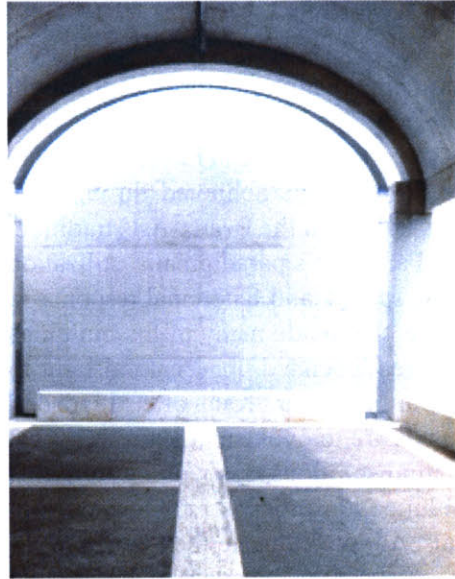
The Beginning Of Ornament

The final type of natural light that Kahn illustrated with the vault form was the light that defined all objects through contrast, color and shape. Louis Kahn had intensely studied the qualities of natural light over many years, traveling in Europe, Asia and Africa to experience firsthand, exemplary light effects achieved through the centuries. As mentioned previously, Kahn was trained in the Beaux-Arts tradition, and he was understandably influenced by the Pantheon's paradigmatic utilization of then contemporary structural, constructional, spatial, and functional response to natural light. Moreover, the recognizable forms that made many of the buildings that he admired, like the Parthenon for example, depended upon natural light to provide a contrasting background for figural, familiar forms. Kahn often alluded to archetypal forms, geometrical shapes, and his desire to evoke and learn from that legacy. Kahn's emphasis on ancient architectural solutions was without mimesis; he simply began with proven, time-tested solutions in order to move away from them and find his own personal interpretations. Anderson has termed this quest as 'a search for beginnings' to emphasize the imaginative, innovative, artistic and personal side of Kahn's interest in the past, rather than the potential for constricting solutions obsolete for present-day design problems.⁴³ Although he often commented on the rhythm of the columns found in the Parthenon and its sequence of light to dark, positive form and negative space for example, Kahn searched for his own unique spatial and structural solutions for each of his architectural commissions. The link to the past may have helped Louis Kahn sense the importance of order and its resultant harmony in architecture, but it was his own realizations and preferences that guided him to use natural light as a tangible building material. For Louis Kahn, the selection of a plan shape was the beginning of order, an order that he strove to express in his architecture. Demonstrating his realization of a building as a composition in light, Kahn utilized natural light to articulate the Kimbell's structural system from remaining building components.



117. Exterior dining court with Maillol *L'aire*. The dining courtyard is the largest exterior space contained within the building mass. The vines are allowed to grow over wires to give shade, color and texture to the space. The kitchen area is directly behind, interior dining on the right, and gallery space on the left.

118, 119. Exterior porch at entrance and interior gallery. The cycloidal shape is paired with the elliptical end arch below. Light enters from this gap, and from the horizontal slot under the vaults' long span, as can be seen on the right.

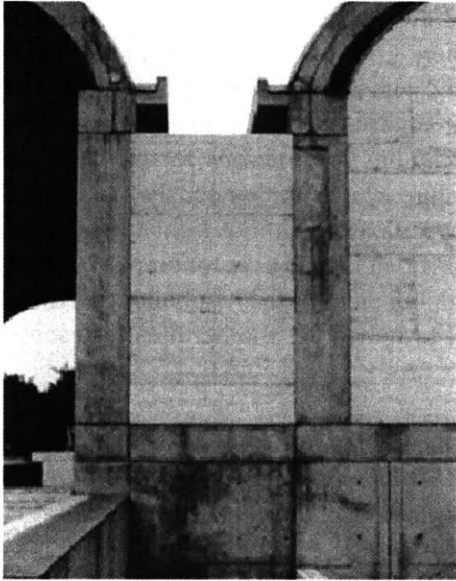


The last natural light quality related to the Kimbell vault structure was actually the first experienced by museum visitors arriving from the park; it was the light that was allowed to enter through gaps and cracks in the building. Museum visitors might not have been aware of the light that was already all around them, if Kahn had not captured this overlooked quality of light into his design. It would seem that this presence of light should have been the simplest to recognize and appreciate, but the light that enters through gaps and slits in a building is something that most architects have avoided. At the Kimbell, Louis Kahn designed gaps in the building so that light could enter and become a part of the design; this quality of light suggested by the vault was brought into the building at the forms' periphery.

The structure of the room must be evident in the room itself. Structure, I believe, is the giver of light. A square room asks for its own light to read the square. It would expect the light either from above or from its four sides as windows or entrances.

120. South elevation. The side elevations of the Kimbell reveal the building's organization and system of separations- vault from vault, and gallery level from its solid base.





121, 122. light well behind portico. The exterior vaults are separated from the rest by a light well which gives light to lower-level offices.

By illuminating the outline of the vault shape, Louis Kahn was able to not only reveal, but celebrate various subtle building details. Critical to understanding the proportions, order and span of the vaults, light was admitted under all of the vaults on the exterior of the building to separate them from infill walls. Even the exterior porticos intended to provide shade, were separated from the main building by a light well serving lower-level work spaces. Based upon the requirement that lightness and dark-ness were equal and opposite, the porticos could have been understood as presenting the opposite condition found on the interior. The porticos were dark, separated from the main building by light, and the interior vaults were lighted from above, and separated from each other by darkness in the servant zones. Light was then a necessary part of darkness, or one might say that the acceptance of the sun was meaningless without its rejection. As Kahn realized, light was not an easy phenomenon to capture. "I gave myself an assignment to draw a picture that demonstrates light. You say that the white piece of paper is the illumination, but when I put a stroke of ink on the paper, I realized that the black ink was where the



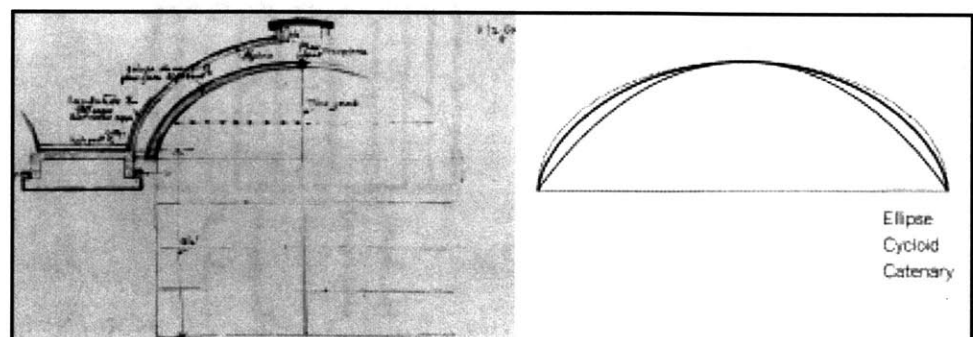
123. Exterior Imagery showcases rhythm of light and dark.

light was not, and then I could really make a drawing, because I could be discerning as to where the light was not which was where I put the black. Then the picture became absolutely luminous.” Kahn suggested with this simple story how elemental light is to the legibility and understanding of any form, for without light no living thing can see. Thus light is one of the definitions or criteria for life, and for Kahn, it had to be made manifest by his architecture while simultaneously making the architecture that shaped it legible. More specifically, without light to surround them, the vaults might have been extremely difficult to read as autonomous objects. Therefore the admission of natural light on all four sides of the Kimbell highlighted the vaults’ structural role and primacy, while provided yet another means to sense the time of day with a changing light.

I put the glass between the structure members and the members which are not of structure because the joint is the beginning of ornament. And that must be distinguished from decoration which is simply applied. Ornament is the adoration of the joint.

Natural light was allowed to enter the building through narrow gaps in the building, thereby keeping the light level appropriately low for art. Like the types of lighting strategies already discussed, this character of light was absolutely critical to the perception and analysis of the vault form. Even at first glance, the logic for structure and infill was easily recognized on the north and south sides of the building where the cycloidal curve of the roof was juxtaposed with the elliptical shape of its stiffening end arch. Although the elliptical vault shape was designed by the structural engineer August Komendant, it was already in Kahn’s mind to separate the arch’s profile from the enclosing wall below with a narrow glass strip. The solution reached at the Kimbell highlights the subtle difference between a cycloidal curve and an ellipse, and the legibility of end walls as non-structural. The end walls consequently appeared to be removable and independent to the vault structure. Perhaps it could thus be said that the Kimbell Art Museum began as a design for a roof as shelter, light modulator, space maker and structural identity. However, the Kimbell roof paradoxically rejects and accepts sunlight, according to Kahn’s multivalent functional, spatial and aesthetic criteria. Like the roof skylights, the gaps below the vaults restricted the amount of light that could enter the galleries and potentially damage the artworks within, yet brought in enough light to infuse the closed interior rooms with a sense of changing exterior conditions. Also similar to the roof articulation, the glass slots under the vaults’ sides emphasized the forms extreme horizontality and impressive span. In addition to the glass located on the vault ends, thin horizontal strips allowed natural light to enter the interior under the long

124, 125. Cycloidal curve compared with an elliptical curve. The difference is very subtle between the two shapes, separated by light.

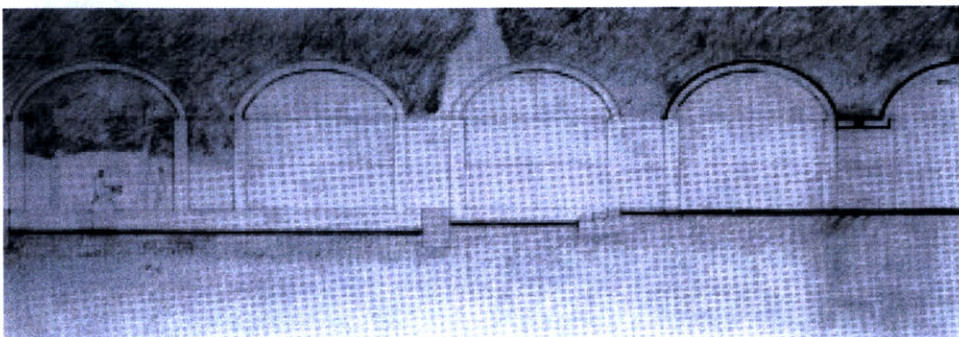




126. Gallery interior. Both the horizontal light slot and curved slot at the vault's end can be seen together at the building periphery.

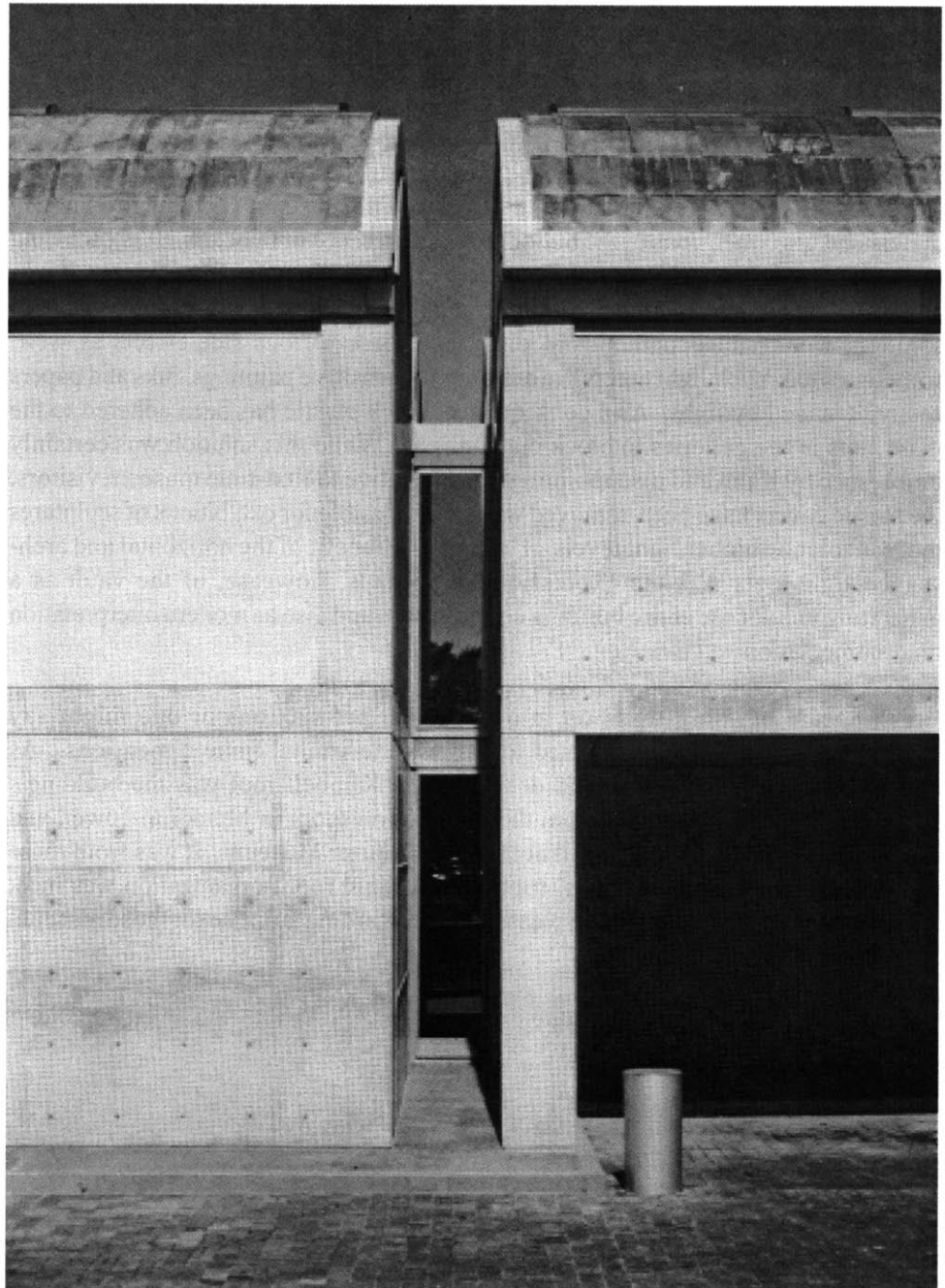
sides of vaults located on the building exterior. The museum visitor could thereby understand the dimensions of the building by the presence of light as well as enclosing walls. Wherever the vault structure occurred natural light was blocked, but it was always allowed to enter underneath the vaults' ends and sides. Unfortunately this solution, wonderful experientially, did cause some serious side-effects as well-sometimes too much light enters the building for sensitive paintings, inks and papers easily damaged by light. As a consequence, black plastic has been adhered to the glass slots in the galleries to block out sunlight. While this solution was certainly unforeseen by Kahn and disappointingly unattractive to first-time museum visitors, the plastic covers have been removed whenever possible for exhibitions of sculptures that can tolerate higher light levels. The primary benefit of the horizontal and arch-shaped light slots was the expression, or perhaps showcase, of the vault as a generating unit for the entire building composition, and also as modern interpretation on ornamentation.

Breaking the building mass up into three distinct sections or one might say movements, natural light was used to express the vaults' finite dimensions. As mentioned earlier, the layout and design of the Kimbell roof was the building's fifth elevation, clearly visible from the observation room in Memorial Tower, and to a lesser degree, from up the hill at the Amon Carter Museum. It was from these vantage points that the buildings' tripartite roof and room organization was most legible on the exterior, certainly a pleasant and rewarding surprise for those museum



127. Section through the Kimbell's center by Kahn, 1968. Kahn intended to use light dividing slots on the vault ends early in the design process. The glazing matches the curve of the roof in this version.

visitors who also visited the tower to oversee the entire park and downtown Fort Worth. Conceptually, the barrel vault could have extended infinitely if supported on load-bearing walls on its sides, but the use of the columnar supports that give great spatial flexibility to the interior also render the form finite-limited by its spanning capability. Rather than simply accept this constraint as a part of the design that he created, Louis Kahn chose to highlight the limitation of his structural system. The segmented, tripartite arrangement of the Kimbell vault groupings was necessarily expressed on the roof of the building, but, more important to the reading of the structure on the building, the vault arrangement was also made legible on the exterior elevations of the museum. As shown in the examination of Kahn's site design



128. Gap between two vault sections. The three rows of vaults are separated with light to give scale and clarity to the organization. Lower flat roof contrasts with the rounded profile of vaults.

process, the three-part organization of the final building was not a part of the original concept, but emerged much later due to a shrinkage of the museum's size. The switch from an immense square plan shape bisected in the middle by the existing rows of trees in the park to a much smaller building prompted Kahn to use a different arrangement for the vault forms, appropriate for the more intimate scale of the new site and building organization. Playing a decisive role in the articulation of the new layout of vaults and their interior spaces, Louis Kahn employed gaps in between the ends of vaults to express a different scale. As seen in early models (pgs. 46, 47, 48), the vaults were originally intended to run the entire length of the building uninterrupted on the building's eastern and western sides. These early designs

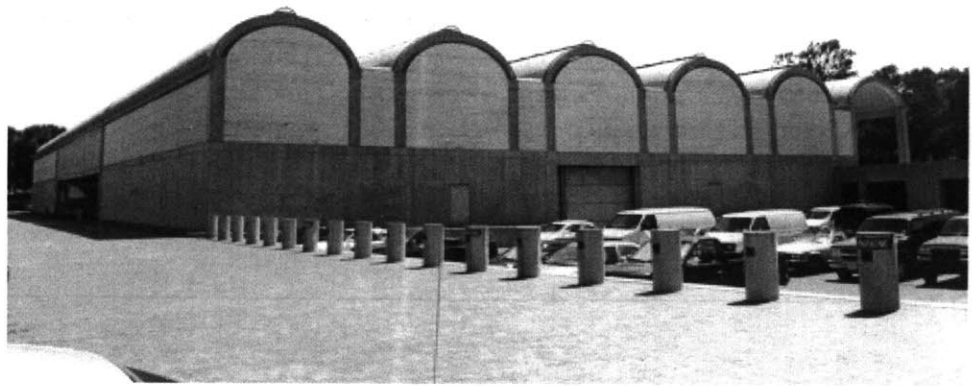


129. The ripartite building organization of building is legible on the eastern elevation.

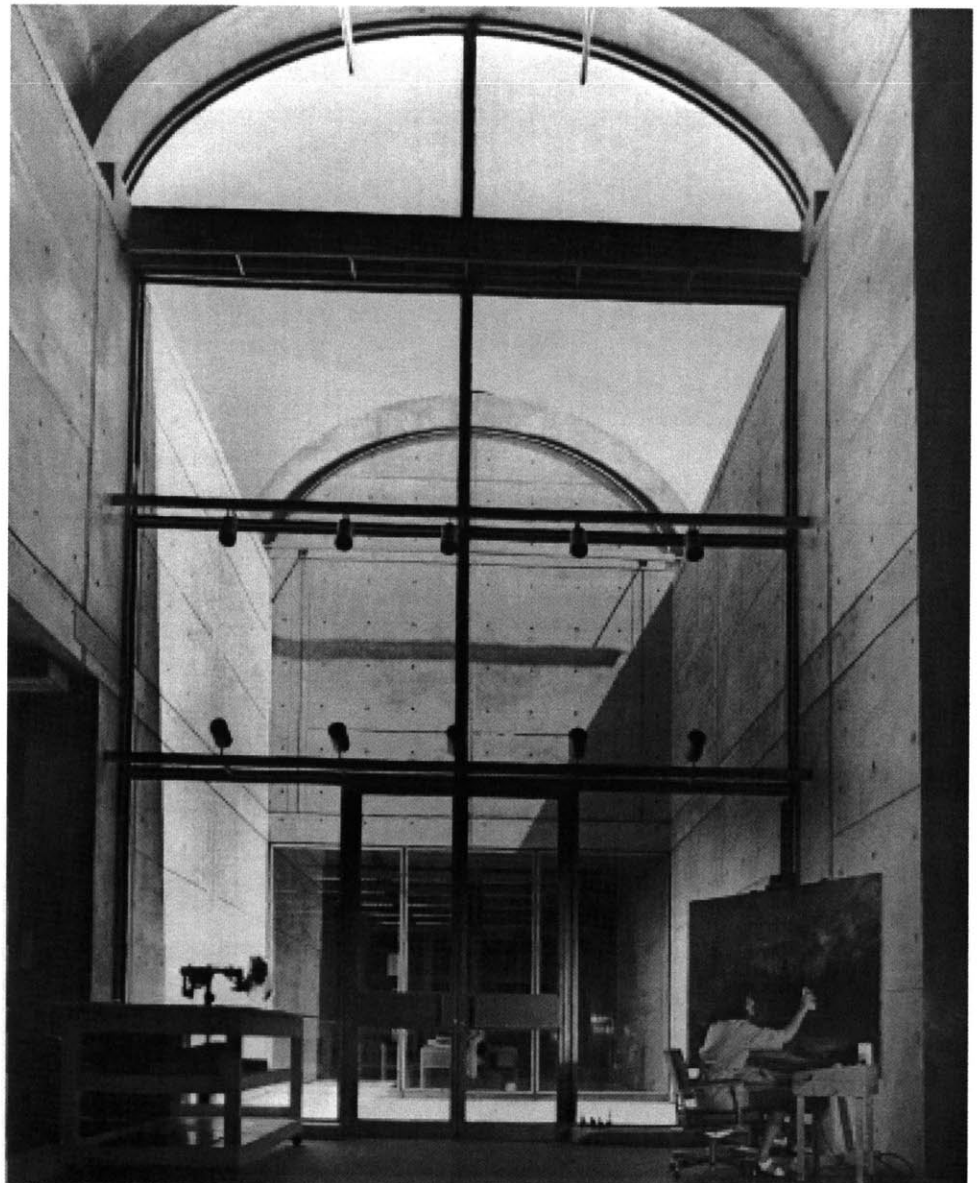


130. Small light court with fountain. The courts give colored light to the vaults from reflections off of water and vegetation. Columns are clearly visible around the court.

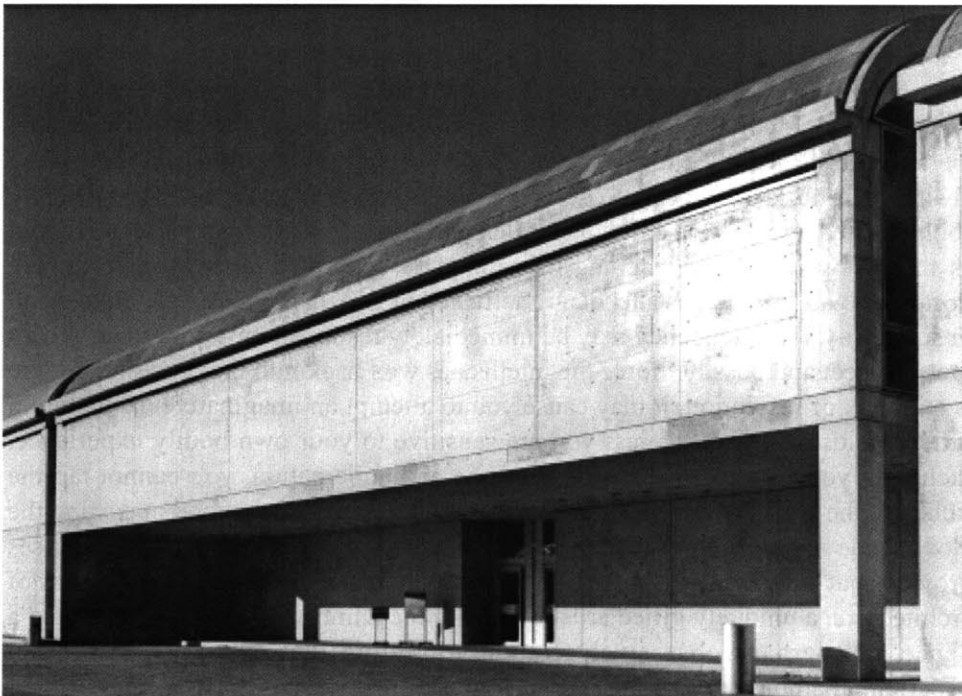
136. North-east side
of building.



132. Conservators'
court extends down
through the roof to the
lower level.



utilized walls to support the vaults, and thereby expressed the conceptual possibility for infinite vault lengths. However when the size of the building shrank due to budget constraints, he realized that each vault 'wanted' to be supported on four columns, *only*. Located at the four corners of the structure, Kahn realized that the columns not only created a bay size, but a room size as well. Thus the design process for Louis Kahn gave him an incipient opportunity to realize the vault structure as a giver, or modulator, of natural light. Kahn moved away from an overall homogeneous expression for his building, to one that substantiated the true aggregate nature of the design. On all sides of the building, the vaults' dimensions were clear, and distinct from one another. Each vault-form was separated from all others, irrespective of the viewer's vantage point. And these separations had flat roofs in contrasts to the arched profile of the vaults that they connected, and paradoxically separated. Whether the flat roof sections joined or divided the taller and wider arched vault sections from each other stimulated ambiguous readings that prompted yet another interpretation- does the building seem to expand or contract? The 'in-betweens' became a necessary component of the Kimbell design that acknowledged the vault forms' limitations due to columnar supports, and also yielded a clearer reading of the overall structural system. Thus the horizontal light strips placed directly underneath the vaults were analogous to the vertical gaps placed between each vault grouping. This in turn allowed natural light to enter on the ends of every vault in the museum, and necessitated the gaps for light on the vault ends. Based upon this analysis of the structure as a giver of light, it has consequently become clear why there were no openings related to human scale or want, (except entrance doors to allow access into the building of course). Simply stated, the building reveals itself.....through light.



133. East Elevation. The library is directly behind the large concrete beam over entrance, and is separated from the vault by a light slot at the reading room's floor level. A minimal amount of glass is provided for the entrance that 85% of all museum visitors use.

From Wonder Is Realization

Rare in the canons of architectural design has so much variety been extracted from a single archetypal structural unit. ...*One wonders what Louis Kahn could have accomplished with several.* The Kimbell has emerged from underneath extensive scrutiny to rise to the level of one of the best buildings in the world in the mind of the author, (and several others as illustrated on page 27). Kahn's wish to 'give an offering to architecture' has significant weight at the Kimbell Art Museum. Surely everyone may not appreciate the building's questionable characteristics: vapid east elevation (fig. 17), non-existent west elevation (fig. 21), reticent material palette and detailing (fig. 18), noticeably forced and ill-fitted auditorium (fig. 98), shockingly unresolved solution for artificial light in the library reading room (fig. 99), and the lower-level spaces so often cited by critics. Yet in spite of these criticisms (and some of my own), the accomplishments achieved by Louis Kahn for the Kimbell Art Museum overwhelmingly outweighed all of its apparent deficiencies. Robert Venturi has noted that examples which are both good and bad at the same time will perhaps in one way explain Kahn's enigmatic remark: "architecture must have bad spaces as well as good spaces." Apparent irrationality of a part will be justified by the resultant rationality of the whole, or characteristics of a part will be compromised for the sake of the whole. The decisions for such valid compromises were one of the chief tasks of the architect. Kahn preferred the gallery because it was directional and non-directional, a corridor and room at once. Kahn by implication [with the Kimbell] questions rigid specialization and limited functionalism. Valid ambiguity promoted useful flexibility.⁴⁴ Louis Kahn was an artist, and like others before him, his work remains open to each individual's personal interpretation, and judgement. That the design communicated ambiguity so clearly to me surely reflected my own aesthetic bias, but hopefully reflected Kahn's intentions as well.

Many of the ideas conveyed in this thesis could not have been possible without my own personal interaction and experience of the Kimbell Art Museum. Admittedly the average museum visitor is ill-equipped to discern most of the nuances of the design. The building appears so deceptively simple, yet reveals itself to be a highly sophisticated and complex architectural achievement. My own experience served as the springboard into decoding the ambiguous interpretations of the Kimbell. Porter has written, there is a tendency activated in you that requires you to respond in some way. That tendency may be immediately resolved, or, failing that, it may arouse affect and possibly force the intellect as well back into the process. If there is still lack of resolution, it may cause you to attempt an imaginative excursion in order to close the gap. Unless you are sensitive to your own bodily experience, including your senses of irritation, surprise and anticipation, you cannot tap the riches of the world of expectation. Many architect's are fairly good at casting the cloak aside and at being sensitive to the stimulation and direction that surprises provide, but it is not easy.⁴⁵ It is my opinion that Louis I. Kahn was a master of architecture, a uniquely gifted artist that, with the Kimbell Art Museum, created a dense and perhaps obsessively complex building that continues to prompt experiential ambiguities.



134, 135. Long, side of vault compared to the end- light is under both.

We can never think clearly in terms of another's reactions; we must learn to see things for ourselves in order to develop a language of self-expression. The capacity to see comes from persistently analyzing our reactions to what we look at and their significance as far as we are concerned. The more one looks, the more one will come to see. Form comes from wonder, and this wonder gives rise to knowledge.



136. Elegant Proportions of vault are displayed in porticos.



137. The front entrance to the Kimbell Art Museum.

Endnotes

1a. Luca Bellinelli. *Louis I. Kahn: The Construction of the Kimbell Art Museum*. Milan: Skira editore, 1997, p. 24.

1. Stanford Anderson, "Public Institutions: Louis I. Kahn's Reading of volume Zero." *Journal of Architectural Education* 49, no. 1 (September 1995): 10-21. Kahn's facination with English history is questioned as a beginning, or window into a past, ancient time forgotten and unrecorded. A relationship is established between Kahn and Violet-le-Duc, another form-giver of idealized institutions from a European perspective. Although Anderson admits suspicion of fundamentalism and appeals to origins, he extends great latitude to Kahn's malleable, interpreted, exploratory, nonauthoritarian search for architectural beginnings. Anderson's analysis points out Kahn's personal, romanticized, inimitable design process, and the need to discover (experience) Kahn's enigmatic work.

2. Immanuel Kant, *The Critique of Judgement*, trans. James Creed Meredith 1952, Reprint, Oxford: Clarendon Press, 1973. It is yet to be seen whether Kahn's late work in Bangladesh will be regarded as genius, or find its way into mainstream, modern architecture. As can be seen in the accompaning photographs, Kahn's mature work was very distinct, and perhaps even aesthetically strange, yet always visionary. Kahn's work in Bangladesh was similar in appearance and ideology to an earlier design of 1959-62 for the U.S. Consulate, in Luanda, Angola, where the client remarked in a meeting on June 24th that the design was "bizarre, windowless, ...the whole concept is rather cold and formidable."

3. Rober Venturi, *Complexity and Contradiction in Architecture*. New York: The Museum of Modern Art, 1966, p. 13. In this seminal work, Venturi quotes Kahn extensively to reinforce his own ideas about the validity of ambiguity in architectural design, challenge the pervasive modernist belief that form follows function in architectural design, and highlight the experiential, subjective, artistic qualities of architecture. Venturi worked in Kahn's office from 1956 to 57, and has been credited with helping to lead Kahn towards his own distincitve, voice balanced between abstract geometries and poetics. (see Louis I. Kahn: In The Realm of Architecture).

4. Lance Wright, editor. "The Span of Kahn." *The Architectural Review* CLV, no. 928 (June 1974): 319. Kahn's ambiguous language, buildings and life are shown to be in opposition to the Modern Movement. "It seems nearer the truth and more illuminating to see him as the protagonist of those perceptions about architecture which the Modern Movement so thoroughly and so disastrously suppressed. It is significant that, so long as the Movement was flourishing as an architectural ideology, Kahn was emphatically not. There is no great architectural distinction in Kahn's early work; he is thus the prophet of the suppressed generation. He was a man constantly being taken by surprise by the appearance of his own buildings. It was, of course, this feeling his way and openness to surprise which made him such an appealing teacher."

5. Anne Griswold Tyng, a graduate of Gropius's Harvard program, worked in Kahn's office from 1945, at the age of 25, until Kahn,s death in 1974, and conceived one child with Kahn- Alexandra Tyng. Anne Tyng was collaborator on numerous projects, and generally co-credited for some of the most unique, if not obsessively geometrical solutions, during the early years of Kahn's career.

6. Duncan Robinson, *The Yale Center for British Art: a tribute to the genius of Louis I. Kahn*. New Haven: Yale University Press, 1997, p. 3.

7. Venturi, p. 25.

8. This viewpoint can be easily challenged with an analysis of several projects throughout Kahn's career, including the Richards Medical Research Building, The Salk Institute, and especially Kahn's work in Bangladesh. For these projects, Kahn studied numerous site designs with various plan studies and perspectives throughout an extended site design phase.

9. Wright, 320.

10. Lawrence W. Speck, "Evaluation: The Kimbell Museum." *AIA Journal* 71 (August 1982): 39.

11. According to the Kimbell Art Museum, the Will Rogers Memorial Complex was constructed in 1936 to house the Fort Worth Frontier Centennial. This city-wide celebration showcased a large livestock show, and was intended to compete with Dallas for revenues from large, fair-going crowds. The massive, concrete auditorium, tower and coliseum were designed by Wyatt C. Hedrick of the Wilmer G. Withers Company to reflect an 'expansive Texas attitude' in a park setting. The complex has become a center for various events ranging from garden and dog shows to sporting events, such as ice skating and hockey games, lectures, concerts and art exhibitions. It is interesting to note that this was the type of site considered desirable by Kimbell for the proposed museum, "It will be someplace where a poor, barefoot colored boy will be welcome, not a rich man's neighborhood." -B. M. Newhouse, (New York art dealer from whom Kay Kimbell purchased his first painting), 1964 interview printed in the *Fort Worth Press*, article by Latryl Layton, October 14, 1964.

12. "Although it was not publicly announced at the time, the major restriction on the Foundation was a forty-foot height limitation for any part of the structure of the Kimbell Art Museum. The splendid and widely appreciated view of the city from the Amon Carter Museum and its terraces was prized." -Kimbell Art Museum. *Kimbell Art Museum: In Pursuit of Quality*. Fort Worth: 1987, p. 12.

13. Klaus-Peter Gast, *Louis I. Kahn: The Idea of Order*. trans. Michael Robinson, Basel: Birkhauser Verlag, 1998, p. 12.

14. Kenneth Frampton, *Studies in Tectonic Culture: The Poetics of Construction in Nineteenth and Twentieth Century Architecture*. ed. John Cava. Cambridge: MIT Press, 1995, p. 236.

15. Kahn, interviewed on the design of the Morris House, Mount Kisco, NY, in 1973, in Heinz Ronner and Sharad Jhaveri. *Louis I. Kahn: complete Work, 1935-1974*. 2d ed. Basel and Boston: Birkhauser Verlag, 1987, p. 98.

16. Brawne, Michael, *Kimbell Art Museum*. London: Phaidon Press Ltd., 1992, p. 9. Most revisions made during 1968 were the result of various cost estimates which showed that the building costs would exceed the limit set by the Board. A radical shift occurred in August 1968, reducing the size of the museum and simplifying the plan into two, almost identical wings. However, Richard Brown was still worried about the size of the museum, so much so that he signed himself in a note to Kahn as 'Richard the Chickenhearted.' His concern was about scale and, perhaps more importantly, about money. The latest estimate, performed early in 1969, was just under \$8,000,000 against an original budget of \$5,871,500 excluding fees. (Also see Cummings Loud, p. 131; letter dated November 5th, 1968).

17. Peter Blundell Jones. "Texas Masterpiece." *Architects' Journal* 9 (March 1992): 49. "As with the Beaux Arts tradition which inspired him, there is always a danger with Kahn that the geometry can become too dominant, the schematic idea of a repeated element too insistent. Yet at Kimbell, thanks perhaps to a relatively protracted gestation, the balance between the general and the particular comes off to perfection."

18. Patricia Loud, *The Art Museums of Louis I. Kahn*. Durham, NC: Duke University Press, 1989, p.126.
19. Summary of Landscape Plan, February 10, 1970, Patton to Kahn and to Brown. Kahn Collection, Kimbell Art Museum, Patton, George, Landscape Architects, File Box LIK 37.
20. Ibid.
21. Loud. "The Critical Fortune." *Design Book Review* 11 (Winter 1987): 52.
22. Dana Cuff. "Light, Rooms And Ritual." *Design Book Review* 11 (Winter 1987): 44.
23. *Contract Interiors* 132, no. 8, "Kahn's Kimbell: A Building in praise of nature and light." n.p. (March 1973): 84.
24. Cuff, 47.
25. Komendant, August E. *18 Years with Architect Louis Kahn*. Englewood, NJ: 1975, preface: "Kahn's knowledge of advanced engineering was inadequate to cope with his architectural ideas. He badly needed practical help from somebody knowledgeable to give him encouragement, and to discuss the possibilities for realization of his ideas- commonly expressed verbally and by artistic sketches only." Dr. Komendant did not attend the Kimbell Art Museum opening ceremonies, because his name and contribution was omitted in a local newspaper article announcing the museum opening and its special characteristics. Komendant also collaborated with Kahn on numerous other projects such as the Richards Medical Laboratories, First Unitarian Church, and the Salk Institute, yet, he admits that he has not seen the Kimbell since its final completion.
26. (For an illustration of the generation of a cycloidal curve and its relationship to the realized building, see fig. 1a.). "The initial suggestion for cycloidal vaults had come from Marshall Myers. The outline of the vault is derived from the path of a fixed point on a rotating circle moving from one side to the other. The bottom edge of the shell supported the flat concrete roof slab between the individual vaults and was stiffened by it." Michael Brawne. *Kimbell Art Museum*. London: Phaidon Press Ltd., 1992.
27. It can be safely inferred from Kahn's initial sketches that a true vault was never the desired goal for the Kimbell. By nature, a barrel vault usually rests upon walls on its long sides, yet Kahn supported his vaults with corner columns from the very beginning. This initial move transformed the vaults when constructed out of concrete, thus Kahn's description of the Kimbell suggested vaults *as a sign*, more than actual condition. This would seem to be in contrast to his stated belief that a building must faithfully express how it was made, yet this design move, I believe, also recognized the futility of attempting to construct the Kimbell out of actual masonry vaults supported by columns for an open plan. Kahn's vaults make the open plan possible.
28. Michael Benedikt. *Deconstructing The Kimbell*. New York: SITES/ Lumen, Inc., 1991, p. 61.
29. Peter McCleary. "The Kimbell Art Museum: Between Building & Architecture." *Design Book Review* 11 (Winter 1987): 50.
30. Klaus-Peter Gast, 96.
31. Vincent Scully. Introduction to *The Louis I. Kahn Archive: Personal Drawings: the completely illustrated catalogue of the drawings in the Louis I. Kahn Collection* 7. New York: Garland Architectural Archives, 1987, p. 18.

32. Benedikt, 61.
33. Klaus-Peter Gast, 8.
34. William Jordy. "Criticism." *The Architectural Review* CLV, no. 928 (June 1974): 331.
35. Loud. "The Critical Fortune." 54.
36. Romaldo Giurgola. "Giurgola On Kahn." *AIA Journal* 71 (August, 1982): 32.
37. "Symbolically and ideologically the Pantheon idea survived because it describes satisfactorily, in architectural form, something close to the core of human needs and aspirations. By abstracting the shape of the cosmos into a grand, immediately assimilated image, the architect of the Pantheon gave mankind a symbol that transcends religion, class, and political conviction. In contrast to Gothic architecture, for example, the Pantheon's religious associations are ambiguous, if they exist at all. Because it was not freighted with any sectarian or localized meaning, and because of the universality inherent in its forms, it was unendingly adaptable. It is one of the very few archetypal images in western architecture." William L. MacDonald. *The Pantheon: Design, Meaning, and Progeny*. Harvard University Press: Cambridge, Massachusetts, 1976, p. 132.
38. Loud. *The Art Museums of Louis Kahn*, 106. "Quantity of natural light was less important to Brown than the sense of participation in the natural world that it gives. He set no limits, though, on the amount of light in the galleries. Although this seems surprising given today's attitudes, at that time the museum profession was only beginning to be concerned with the exact measurement of candlepower in exhibition areas. [Brown] wanted changes in weather, the seasons, and the position of the sun to be realized within the building and become a part of the observer's experience of the art. He believed that unchanging and unwavering light would make the objects and the museum seem 'canned,' or packaged."
39. John Lobdell. *Between Silence And Light: Spirit in the Architecture of Louis Kahn*. Canada: Shambhala Publications, Inc., 1979, p. 94.
40. Jones, 44.
41. Frampton. *Studies in Tectonic Culture*, 242.
42. Speck, 40.
43. Anderson, *Journal of Architectural Education*, 21.
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MIT Rotch Visual Collections

figures 27-30, 47, 118, 119, 130.

Yukio Futagawa

figures 101, 141-143.

Shahidul Alam/Drik (Picture Library Ltd., Bangladesh)

figure 3.

Michael Benedikt/Gong Szeto

figure 62.

Michael Bodycomb

figures 1, 34-36, 39, 41, 55, 59, 65-68, 70, 74, 76, 94, 96-99, 121, 122, 126, 136, 137.

Michael Brawne

figures 138-140

David B. Brownlee

figures 2, 4, 7.

Urs Buttiker

figure 103.

John Hewitt

figures 75, 127, 128, 129.

Anwar Hosain

figure 8.

Philip Johnson

figure 31.

Peter McCleary

figures 62, 63.

Marshall Meyers

figures 72, 117, 128.

Hans Namuth

figure 145.

G. P. Panini, National Gallery of Art, Washington, D.C. (Samuel H. Kress collection)

figure 95.

Joan Ruggles

figure 144.

Robert Shaw

figure 85.

David C. Sledge

figures 1, 5, 6, 9-22, 27-30, 53, 69, 73, 77-80, 82-84, 86-93, 120, 129, 131, 133-135, 146.

Appendix 1

THE KIMBELL ART MUSEUM

BUILDING DATA

Date: 1966 – 1972

Location: 3333 Camp Bowie Boulevard.

Nine and a half acres (413,820 sq. ft.) in Amon Carter Square Park, a site bounded by Camp Bowie Boulevard, West Lancaster Avenue, Will Rogers Road West and Arch Adams Street in Fort Worth, Texas. The Kimbell is part of a cultural complex consisting of the Amon Carter Museum, the Modern Art Museum of Fort Worth, the William Edrington Scott Theater, the Fort Worth Museum of Science and History, the Will Rogers Memorial Coliseum and Auditorium, and the Casa Manana Theater.

Dimensions: Sixteen concrete vaults each with a clear span of 100 feet by 23 feet arranged in three rows of six units each. Gross area is 120,000 square feet, of which only 30,000 square feet is public gallery area. The building is 318 feet long by 174 feet wide and 40 feet tall from the lower level, but only 20 feet tall from the main gallery level.

Architect: Louis Isadore Kahn, FAIA (1901-1974)

Gold Medal from the American Institute of Architects

Fellow of the American Academy of Arts and Letters

Royal Gold Medal for Architecture from the Royal Institute of British Architects

Building Awards:

Best Building Award, National General contractors Assoc., 1972

Lumen Award, Illuminating Engineers Society, 1973

Engineering Excellence Award, Consulting Engineers Council of Texas, 1975

Honor Award and Bartlett Award, American Institute of Architects, 1975

Award of Excellence, The Art Museum Association, 1982

Citation of Honor, Texas Society of Architects, 1985

Twenty-Five year Award, American Institute of Architects, 1998

Client: Kimbell Art Foundation

Structural Engineer: August E. Komendant

Associate Architect and Engineer: Preston M. Geren

Mechanical / Electrical Engineer: Cowan, Love & Jackson, Inc.

Landscape Architect: George E. Patton, Inc.

Contractor: Thos S. Byrne, Inc.

Project Architect: Marshall Meyers

Lighting Consultants: Richard Kelly and Edison Price

Acoustic Consultant: C. P. Boner

Earliest Project Date: June 1, 1966

Contract Date: October 5, 1966

Starting Date of Construction: July 15, 1969

Date of Completion of Construction (Opening): October 4, 1972

Construction Cost: \$6,500,000.00

Equipment and Furniture: \$1,000,000.00

Total Cost Per Square Foot: \$62.50

Exterior Building Materials:

Poured-in-place concrete for structure

Unfilled travertine veneer from Bagni di Tivoli, Italy for infill walls, court paving, steps, and wall copings

Chemical lead sheets for roof shells

Brick pavers for public parking areas

Cedar brown marble aggregate for staff parking lot, walkways, and pool bottom

Loose chips of marble for entrance court beneath yaupon holly trees

Andes black granite for curbs and pool linings

Double insulated glass and polycarbonate acrylic sheeting for galzing

Mill-finish stainless steel for doors, frames, windows and bollards

Interior Building Materials:

As-cast concrete for exposed structure

Quarter-sawn oak for gallery floors, doors, frames and cabinetwork

Slate flooring for kitchen

Anodized aluminum for soffits and reflectors

Mill-finish stainless steel for elevators, kitchen equipment, handrails and miscellaneous accessories

Appendix 2

THE KIMBELL ART MUSEUM

POLICY STATEMENT

Date: June 1, 1966

by. Dr. Richard Fargo Brown, Director of the Kimbell Art Museum
(excerpts)

I. GENERAL AIMS:

Purpose:

The Kimbell Art Museum is dedicated to the education, increased enjoyment and cultural enrichment of the public through the display and interpretation of works of art. Our knowledge and understanding of the heritage of civilization is largely dependent upon the continued survival of the kinds of art objects contained in this museum.

It follows that the paramount duty of the Kimbell Art Museum is to display and interpret to present generations and preserve for future generations, the highest aspirations of past generations as represented in the works of art entrusted to its care.

Scope:

The Museum aims to form collections of the highest possible aesthetic quality, derived from any and all periods in man's history, and in any medium or style. The entire province of art is considered appropriate as the source of material for the collections.

Program:

Consistent with the educational, interpretive and recreational purposes of the Kimbell Art Museum, the constant display and interpretation of its permanent art collection, plus programs of changing exhibitions, scholarly lectures and symposia, conferences of visiting scholars, continuing research in art, publications, and the encouragement of the general public's understanding and interest in art shall be undertaken. The Museum, through its staff, shall participate in all activities considered to be in furtherance of the encouragement of art.

II. ACQUISITIONS:

The dominating principle involved in the acquisition process is that the stature of the Museum depends more upon the quality of the definitive objects it contains than on the historical completeness of its collections. A prospective addition to the collections, therefore, is to be judged from the standpoint of aesthetic quality and typically, and whether it defines a master, period, school, style or area. The goal shall be definitive excellence, not size of collection.

III. FACILITIES FOR IMPLEMENTATION:

- A. The Museum building is a work of art itself, and it is designed, constructed and maintained according to those same concepts of high aesthetic standards that govern the collections which it houses. It is a creative contribution to the evolving history of the art of architecture, as well as being a functional instrument for the care, study and exhibition of the other arts.
- B. Since our knowledge and understanding of the heritage of civilization is largely dependent upon the continued survival of the kinds of art object collected by this Museum, it follows that the paramount duty of the Museum's program pays obeisance to and, where necessary, gives way to this trust. A continuing security and conservation program, and the funds, space, facilities, staff and technical equipment to maintain it are provided.
- C. The Museum maintains a reference library. It is primarily a staff library so that the total program of the Museum may be carried out with economy and efficiency. It is not a lending library, and it is not for the general public's use, although qualified scholars, teachers, curators and students are welcome to use it at the discretion of the librarian and the director. The constant growth and increased efficiency of the library is a major concern to the Museum.
- D. In addition to the public galleries, the conservation facilities and the library, the following facilities are provided and maintained to implement the museum's total program: a special exhibition gallery, an auditorium, bookshop, administrative and curatorial offices, Trustee's board room and office, a room for members or 'friends.' Adequate storage facilities, maintenance and preparatorial shops, study areas, photographic studio, automobile parking space for visitors, adequate dining and catering facilities for special occasions, and a greenhouse.
- E. Since a limited special exhibition program, which entails borrowing by the Kimbell Art Museum, is part of the Museum's function, it is recognized that reciprocity in lending to other institutions is a necessity. Loans are stringently controlled, however, in view of the primary policy which states that the constant display of the permanent art collection takes precedence over other aspects of public program.

Appendix 3

THE KIMBELL ART MUSEUM

PRE-ARCHITECTURAL PROGRAM

Date: June 1, 1966

by. Dr. Richard Fargo Brown, Director of the Kimbell Art Museum
(excerpts)

I. General Philosophy And Approach To The Building Problem:

- A. The *Policy Statement*, attached, sets forth the purposes, goals, scope, program and general method of operations for the museum. It should be referred to constantly, and it should provide determining criteria for constructing the physical facility, as well as for future management.
- B. The building will exist to: 1. preserve and exhibit objects called works of art; and 2. enable as many people as possible to experience those objects as effectively and as pleasantly as possible; the 'confrontation of object and observer.'
- C. Even though, hopefully, the building will be a creative contribution to the history of the art of architecture, the building itself should play a supporting role to the reasons for its existence, not a dominating role. Architectural 'gymnastics' for their own sake work against these reasons. As in verbal expression, when an alternative is presented between the use of a long complicated word and a short simple one, the latter is invariably the better choice. The overwhelming percentage of people whom this building is intended to serve will not be art historians, other architects, or progressive artists with a sophisticated background in architectural form. Their total experience of a visit to the museum should be one of warmth, mellowness and even elegance. Among other experiences educational and personally enriching, a visitor to an art museum ought to be *charmed*; otherwise, why should we expect him to come? The spaces, forms and textures should maintain a harmonious simplicity and human proportion between the visitor and the building and the art objects observed.

That the above may be accused of 'catering' to 'popular' taste (or lack of it) is nothing to the point. In the past this catering was achieved by making the museum a monumentally awesome repository of 'priceless' art housed in 'period' settings against a background of massive and/or complicated, irrelevant décor. Each individual art object is *now* a whole world unto itself, and architectural conditions should be so disposed as to encourage the visitor's complete absorption in contemplation of that world. Spaces, forms, textures, colors should avoid distracting that attention. As much as possible, the architecture should be flexible enough so that, upon installation (and future changes of installations), the objects of art themselves help create the architecture and prescribe spatial quantity and surface qualities.

The creative strength of such a building lies in simplicity and directness of approach to the uses of the building, clarity of the disposition of parts, honesty in the relationship between visible form and means of construction, taste in the proportions of those forms, quality of materials, and exquisite craftsmanship in putting the materials together. Such a building is not only strong in design, it has the desirable effect of strength upon the average visitor. And, the desired elegance and charm are achieved with restraint and grace. If, in addition, the average visitor can easily find his way through well lit spaces in which, because of clarity of layout, he feels that *he* is making the choices about where to go to see what, then the message we believe to lie latent in art will be imparted more effectively to more people sooner. (Even symmetry has the virtue, at least, of making it easier for people to figure out where they are and how to get to something else, thereby cutting down museum fatigue.)

A building with such an organic integrity cannot be built in stages, with allowances and adjustments being made for future wings, extensions or added floor levels. The form of the building should be so complete in its beauty that additions would spoil that form; and all of the requisite functional facilities should be articulated as components of that form so that, from the outset, the museum will be able to operate as a complete and vital institution.

II. Environment:

A. City of Fort Worth:

Population: city 400,000; metropolitan area 600,000.

Cultural Institutions in vicinity of site: Carter Museum of Western Art, Children's Museum, Fort Worth Art Center, Scott Theater, Casa Manana Theater, Will Rogers Auditorium, Will Rogers Coliseum.

B. Climate:

Average annual rainfall: 31.51 inches.

Annual average temperature: 65.8 degrees. Higher temperatures are a definite problem to cope with architecturally six months of year, often over 90 degrees, sometimes over 100 degrees.

High winds frequent, sometimes carrying considerable earth dust content (factor to consider in: fenestration, water pools, fountains, climate control filter systems, etc.).

Sunlight intensity is frequently very extreme. This is a major factor to cope with, not only because of heat production, but in relation to visual effect on exterior design, psychological effect looking out from building interior, difficulties of potentially high surface reflectance of natural light off art objects, glare when looking at art against natural light source, intensity of light upon art objects in which light causes fading.

III. Site:

A. See topographical detailed map of area, attached to this program (Part Two: Site Design).

Size: approximately nine and a half acres. (413,820 sq. ft.)

Approximate dimensions of sides: North 800ft.; East 900ft.; South 650ft.; West 455ft.

Contour line interval= 10 ft.

North-south roadway running through center of site being eliminated.

Access will be almost entirely by automobile.

- B. The park, of which the site occupies the east end, slopes gently downward from west to east (approximately 50ft. drop total). It is covered with rich grass turf and hardwood trees, the largest being about 50ft. tall. The trees, for the most part, parallel in straight lines the existing roadways. The only existing building in the park proper is the Carter Museum of Western Art, indicated on the map in the apex of the triangle at the west end. The open spaces, with some trees, and the large edifices of Will Rogers Coliseum and Theater lie across Lancaster Boulevard to the south; rather ordinary apartment structures (2 to 4 stories) begin across the street bounding the east end of the site; decidedly unattractive (1 to 2 story) small business and shop buildings across Camp Bowie Boulevard on the north. This surround, combined with the low-lying nature of the site, poses a design problem; there is no outward vista, and the elements of lowness and flatness will have to be utilized for positive effect. Inward orientation and an imaginative garden treatment in relation to terraces and/or building platform will be important.
- C. Height restriction: the drop-off in grade from the main floor and terrace level of the Carter Museum of Western Art to the grade at center of the Kimbell Art Museum site is about 40ft. In accepting the park land from the city, the Kimbell Trustees agreed to adhere to a height restriction of 40 feet so as to avoid impeding the view from Carter Museum. This may mean that the first level of the KAM will have to go partially below grade (parking space, service areas). Roof treatment will have to be carefully considered in this regard as well.
- D. Parking: nearly all visitors will reach the museum by private car (some in taxis or buses). The park should be preserved as much as possible, and the garden setting for the museum should be an important part of the museum visitor's enjoyable experience, with sculpture in the garden. A parking area capable of accommodating about 100 cars should handle the daily routine attendance (two passengers per car, averaging two hour visits, over a seven hour day, 350 open days in the year, with total attendance around 200,000). A parking area filling this need can be placed partially below grade, under the building itself and terrace and/or building platform. Overflow parking (scheduled properly) for large special events can go to vast parking areas for the coliseum across Lancaster Boulevard to the south.

IV. General Requirements of the Building:

- A. The permanent collection may very well number something under 100 objects (1. paintings, 2. sculpture, 3. drawings and watercolors, 4. objects of the so-called minor arts) when the museum opens to the public. The rate of growth, barring certain foreseeable possibilities of the sudden acquisition of a whole group or collection, will probably be at the rate of a dozen or so objects a year. In any case, a basic design problem, therefore, is to build for a new, small, choice collection, but an expanding one. All the space cannot be filled at first, but the unused portion should not yawn openly at visitors.
- B. Attendance for a few months after the museum opens will probably be much higher than that to be expected after the novelty of a new institution and its attendant fanfare dies down. Routine attendance, based upon the current audience potential and local statistics of record will probably be about 200,000 annually. Based upon burgeoning interest in art

in the nation, the projected population growth in the Fort Worth-Dallas area, and the accelerating effect the KAM, its collection, outstanding shows and general program will have upon stimulating an art conscious public, annual attendance in less than five years will probably be over 500,000, and in less than a decade it will reach nearly 1,000,000. (Over 200,000,000 persons visited museums in the U.S.A. last year.)

- C. There are basic divisions into which any art museum is logically disposed because of the different nature of activities, personnel, equipment and type of space required within each division:
1. Service division (shipping and receiving, mechanical, maintenance, etc.).
 2. Public division (permanent collection display, special exhibitions, lectures, films, music, social events, etc.).
 3. Operations division (administration, office work, files, financial control, scholarly research, etc.).

The clearest possible spatial separation between these divisions or areas, and the most carefully integrated relationship or unity of parts within each division, is the most conducive to economy and efficiency of operation, safety, maximum security and enjoyment by the public. For example, a whole host of headaches involving everything from fire exits to public circulation to guard salary costs are avoided if every space that will ever be used by the general public can be kept to one level- the level of easiest access and pleasantest prospects. Besides which, this simplifies and clarifies the visitor's task of finding his way, thereby increasing his enjoyment and the chances that he will 'get the message' intended by the art and the institution. For the sake of organization in this program, these divisions have been placed on separate levels, or floors, of the hypothetical building; this is not a mandate.

V. Notes on features of particular importance to museums:

A. Lighting:

1. Natural light should play a vital part in illumination, consistent with the problems of maximum lineal feet of wall for hanging pictures and avoiding those glare and heat effects already discussed. Since there are so many times when natural light is insufficient (museum open at night, late winter afternoons, very cloudy day, etc.), artificial light must be sufficient to do the whole job. However, if natural light were excluded completely, the art, and eventually the museum visitor, seem vacuum packed in a can. The visitor must be able to relate to nature momentarily from time to time- actually to see a least a small slice of foliage, sky, sun, water. And the effects of changes in weather, position of the sun, seasons, must penetrate the building and participate in illuminating both the art and the observer. We are not after a measurable physical quantity, or a physiological reaction; we are after a psychological effect through which the museum visitor feels that both he and the art he came to see are still a part of the real, rotating, changeable world.
2. Skylights are not the answer: the visitor cannot look out of them; the changing natural effects don't come through them effectively; they cause insufferable design problems; they require huge, wasteful attic and clerestory spaces; and they always leak no matter what is spent on their maintenance. A clerestory natural light source is unsatisfactory for the same reasons.

B. Miscellaneous:

Design layout should keep maximum surveillance of art by security force constantly in mind.
There should be the absolute minimum of doors leading from the building to the outside- the ideal museum has only one spot where the general public enters or leaves the building.
Any given floor level of the building should maintain an absolutely uniform and continuous level surface on that given floor.
Relative humidity steady at 55%.

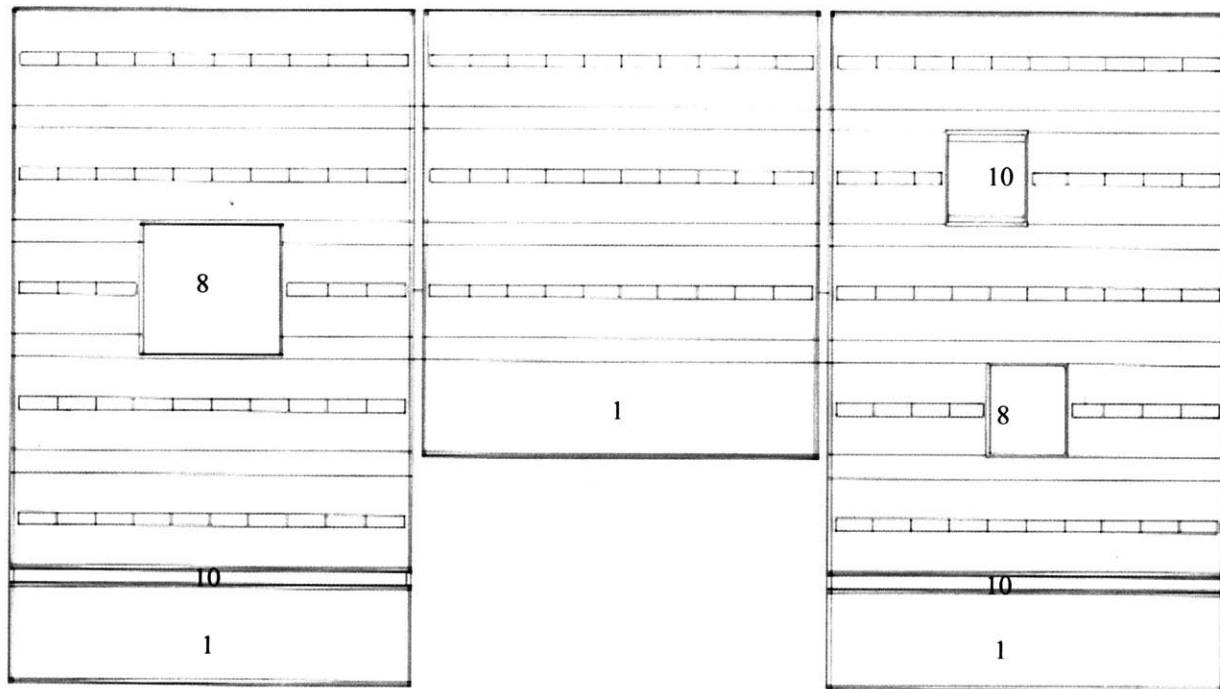
Allocable interior space, basic building:

| | |
|--|-----------------|
| 1. Operations level..... | 14, 950 sq. ft. |
| Administrative and curatorial offices | |
| Boardroom | |
| Library and research area | |
| Conservation studio | |
| Greenhouse | |
| 2. Public level..... | 60,950 sq. ft. |
| Auditorium | |
| Bookstore | |
| Lounge or reception hall | |
| Restrooms | |
| Stairwells | |
| 3. Service Level..... | 21,500 sq. ft. |
| Loading dock with receiving area | |
| Offices | |
| Shops | |
| Photographic studio | |
| Storage | |
| Mechanical room | |
| 4. Net interior allocable space..... | 97,400 sq. ft. |
| Total cost for facility..... | \$5,871,500 |
| Arhitectural and design fee..... | 600,000 |
| Grand Total Cost projected for Kimbell Art Museum..... | \$6,471,500 |

Appendix 4

The Kimbell Art Museum Building Layout

Roof Plan

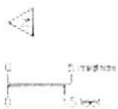
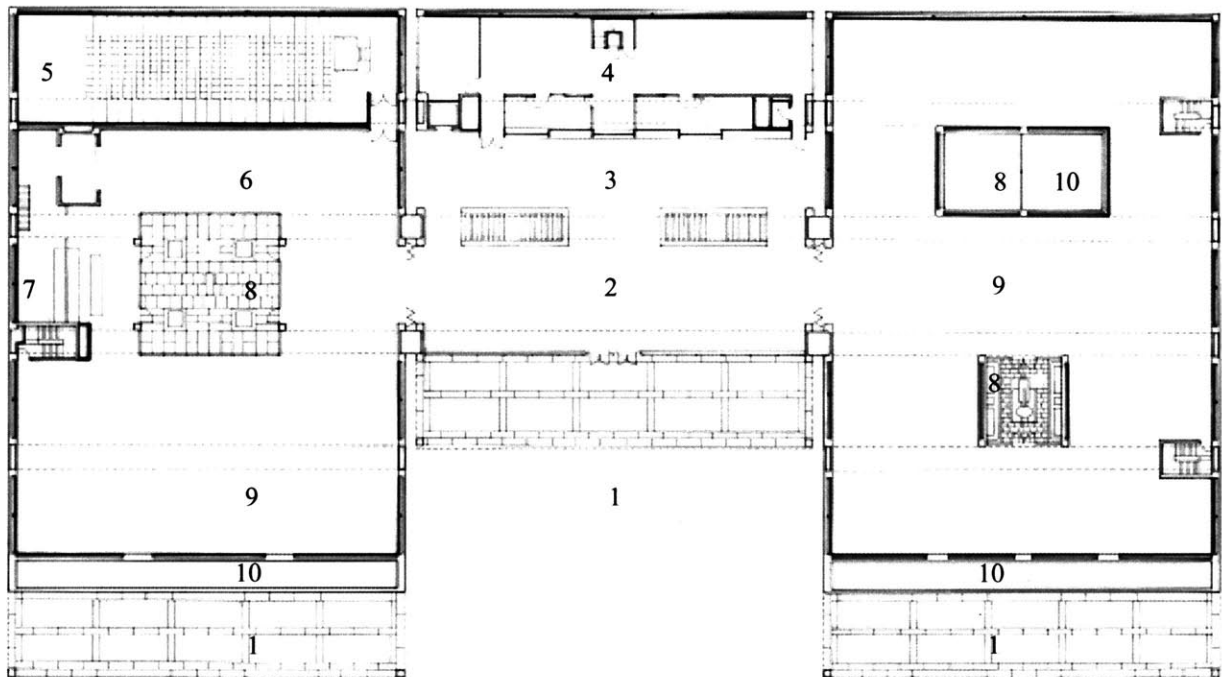


A module is not the repetition of a motif but the expression of an architectural principle.

138. Skylights on the realized building. The three solid vaults at bottom are exterior porches. Three square, exterior light courts are aligned with skylights to admit light from above. All spaces under the vaults, including the kitchen, auditorium and bookstore have skylights, regardless of functional need.

The Kimbell Art Museum Building Layout

Gallery Level Plan

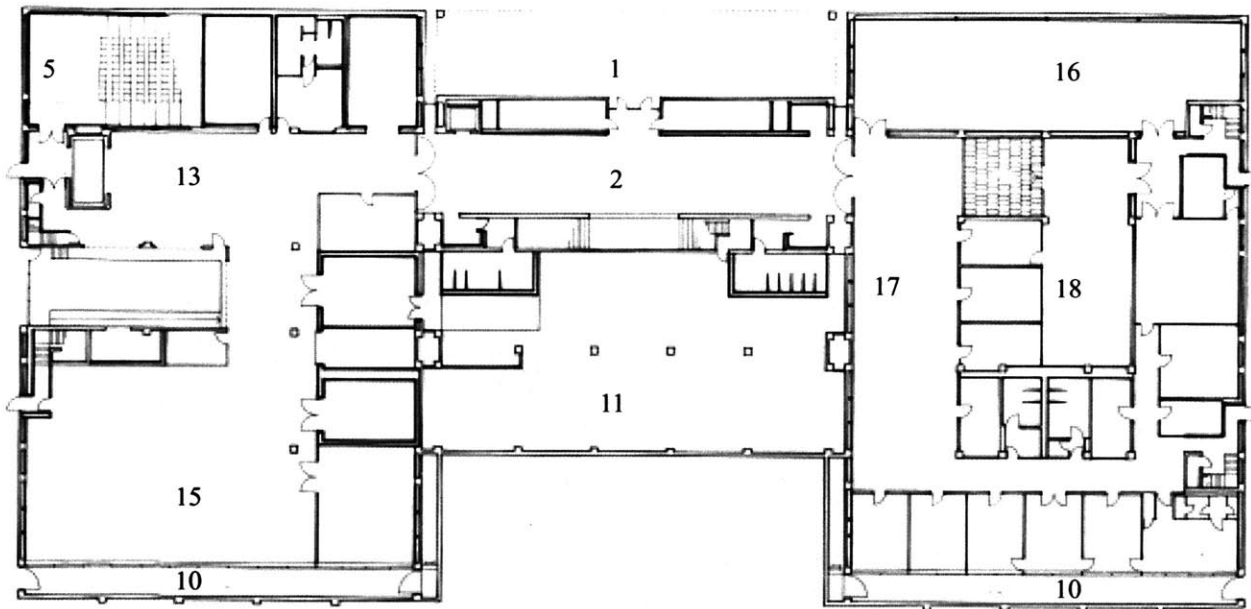


A plan of a building should be read like a harmony of spaces in light.

139. Gallery layout of realized building. The auditorium and kitchen on the left of plan seem forced into Kahn's rigid structural and spatial system. The dining area and elevator are treated the same as gallery space around the largest light court.

The Kimbell Art Museum Building Layout

Lower Level Plan



Key to plans:

- 1 Exterior porch
- 2 Lobby
- 3 Bookstore
- 4 library
- 5 Auditorium
- 6 Dining area
- 7 Kitchen
- 8 Light court
- 9 Gallery space
- 10 light well
- 11 Mechanical
- 13 Receiving
- 15 Shop area
- 16 Storage
- 17 Administration
- 18 Conservation

In Gothic times, architects built in solid stones. Now we can build with hollow stones.

140. Support areas. Kahn originally designed several light courts open through the vault roofs to the sky, before budget cuts. Other than the entry porch, lobby and light wells, the lower level does not follow the vaults' structure, layout or graining.

The Kimbell Art Museum Building Layout

Ambiguous Connection Between Upper and Lower Level

Kahn's Beaux-Arts concept of circulation within the building anticipated that a visitor entering the east entrance on the lower floor would mount the stairs by turning right, view the upper galleries in the north, then the south, and return on the south side of the double stairwell. In practice this pattern proved unreliable, and both sides of the stairway served up and down traffic. The single handrail on each side, placed unobtrusively and not seen until the visitor mounted the stairs, failed to be adequate. When, soon after the museum opened, a visitor fell on the step rising to the landing, a pair of short end-handrails was installed. Subsequently, after several minor falls on the upper stairs, additional matching handrails on the west side of the main stairs were added. With the addition of the new handrails on the stairs, the originals were repositioned in a slightly lower location for ease of use.⁴⁶

141-143. Enigmatic monumental stairs, 1972. Handrails shown on one side only, as Kahn intended. In exchange for the added benefit of safety, one of the Kimbell's original puzzles has been lost—which stair should be taken for which direction. The short rails mounted on the ends of walls were added after the museum opened. Handrails reveal their construction as folded sections of stainless steel. "They seem to comment on the vault theme, for the vault is also an extruded section, and so much in the building has to do with whether you are confronted with its length or its section."—Peter Jones. Dissimilar to Kahn's other museums, the main stair at the Kimbell is not articulated as a figural, free-standing object in space, but obscured from view. Yet the ceiling is exposed as the underside of the cast-concrete gallery floor above, similar to Kahn's other museums.

Monumentality is enigmatic. It cannot be intentionally created. Neither the finest material nor the most advanced technology need enter a work of monumental character for the same reason that the finest ink was not required to draw up the Magna Carter....A stair isn't something that you get out of a catalogue but a very important event in a building.





Appendix 5

Biographical Note On Louis I. Kahn



144, 145. Louis Kahn in Philadelphia, at his architectural office and the Margaret Esherick House.

Louis Isadore Kahn was born on February 20, 1901, on the Baltic island of Saaremaa, Estonia (Russia). There, as a young boy, his face was scarred by fire while carrying hot coals. He emigrated with his parents to Philadelphia in 1905, where they lived in poverty. His upbringing was a traditional Jewish one, although not strictly Orthodox, and his later pursuit of knowledge always had a Talmudic, questioning quality to it. As a high school student, Kahn was gifted as a painter and a musician, winning city wide art prizes and supporting his family by playing the piano in silent movie theaters. He had won a scholarship to study art, but in his last year of high school he took a course in architectural history and resolved to become an architect. From 1920 to 1924, he studied architecture at the University of Pennsylvania, earning his tuition as a teaching assistant. The University of Pennsylvania was at that time a school in the Beaux-Arts tradition under the leadership of the respected architect and teacher, Paul Philippe Cret. Kahn was an exceptional student, and after graduating, he worked in various architectural offices and traveled to see European Architecture. Kahn's Beaux-Arts training made it difficult for him to come to terms with the modern movement in architecture. Although Kahn was absorbed in his architectural practice and was fortunate to complete many commissions, his circumstances were at times miserable. His method of working, which was frequently slow, excluded him from commissions by clients who were motivated by expediency or profit. Business inefficiency in Kahn's office and his commissions in India and Pakistan, which sometimes consumed great expenses and then fell through, burdened Kahn with crushing debts. What is remarkable is that he was able to practice architecture as the highest of arts- totally uncompromised by expediency- and not only survive, but also complete so many exceptional buildings. In addition to directing his own architectural practice, Kahn taught at the Massachusetts Institute of Technology, Princeton, University of Pennsylvania, and Yale. His buildings remain great contributions to human culture and institutions, serving as offerings to all mankind. Louis Kahn died of a heart attack at the age of seventy-three, in the men's room of Penn Station in New York, on March 17th, 1974, alone.⁴⁷

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THE ART OF AMBIGUITY
(Experiencing the Kimbell Art Museum)



146. Kimbell bench in the park.

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